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(54) **Coupling system of modules**

(57) The present disclosure relates to a coupling system (1) of modules (10, 11, 12, 18, 19), comprising at least a first module (10, 11, 18), a second module (10, 12, 19), a pin (4), a first fork-shaped dowel (51), and a second fork-shaped dowel (52). Each module (10, 11, 12, 18, 19) has at least a pair of bores (31, 32) perpendicular to and communicating with each other, which are made on perpendicular faces of the module (10, 11, 12, 18, 19). A first end (4a) of the pin (4) is inserted inside a bore (31, 32) of the first module (10, 11, 18) and a first fork-shaped dowel (51) is inserted inside the other bore (32, 31) of the first module (10, 11, 18) to keep said pin (4) in position and prevent it from slipping out of the first module (10, 11, 18), thanks to the cooperation between the first fork-shaped dowel (51) and a corresponding grooved portion (41) of the pin (4). A second end (4b) of the pin (4) is inserted inside a bore (31, 32) of the second module (10, 12, 19) and a second fork-shaped dowel (52) is inserted inside the other bore (32, 31) of the second module (10, 12, 19) to keep said pin (4) in position and prevent it from slipping out of the second module (10, 12, 19), thanks to the cooperation between the second fork-shaped dowel (52) and a corresponding grooved portion (42) of the pin (4).

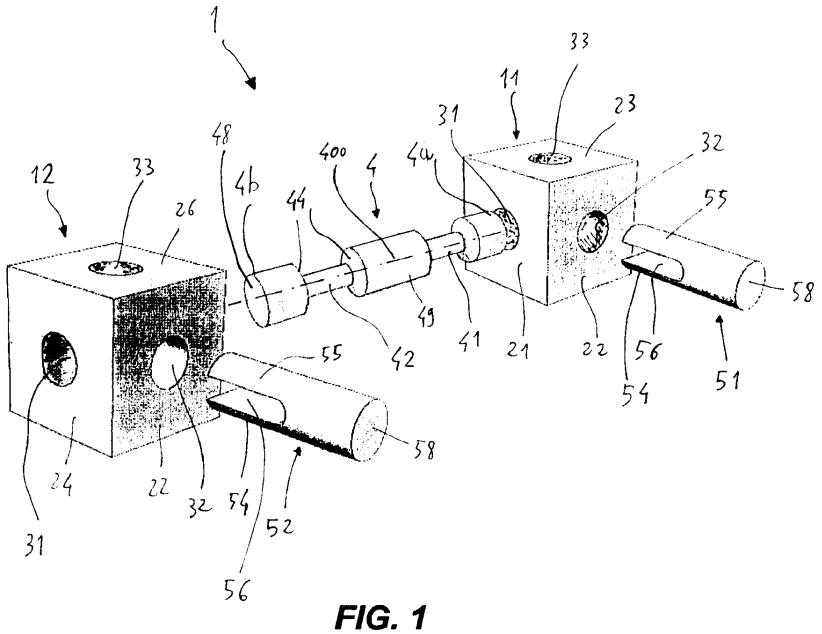

FIG. 1

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Description

[0001] The present disclosure generally relates to the field of coupling systems between pieces. In particular, the present disclosure relates to a coupling system of modules or blocks, which allows a quick and (if necessary) rotary coupling between two modules or blocks. Such a coupling system meets a specific application in the field of toys, although it can be applied to other fields as well.

[0002] Modular toys, which include a plurality of pieces or modules to be mounted together to obtain an assembly or an object, are already known. An example is represented by the modular toys using interlocking bricks that can be joined together.

[0003] The inventor of the subject of the present disclosure has noticed that such known toys do not usually provide for the possibility of obtaining either rotary or fixed joints between the pieces using the same components and in a versatile and simple way. Moreover, the inventor of the subject of the present disclosure has noticed that at least some of such known toys do not allow to couple two or more blocks or modules in a simple way in order to make compositions with dissimilar shapes and without any size limitation.

[0004] Starting from what was noticed by the inventor, the present disclosure deals with the technical problem of providing a coupling system that allows to overcome the drawbacks mentioned above with reference to the prior art and / or to achieve further advantages, or, in any case, that offers an alternative to the known coupling systems.

[0005] This is achieved by providing a coupling system of modules according to independent claim 1. The technical problem is also solved by a method for coupling modules according to claim 15.

[0006] Specific embodiments of the subject of the present disclosure are defined in the corresponding dependent claims.

[0007] According to an aspect of the present disclosure, the modules (or blocks) have perpendicular faces, in which bores intersecting with each other are made. A grooved pin is inserted into a bore of a module and then this pin is held stationary inside the module through the insertion of a dowel into an intersecting bore. The dowel prevents the pin from slipping out, but it can allow the rotation of the pin, if necessary.

[0008] In other words the pin, once inserted inside the bore of the module, is kept in position by a fork-shaped dowel that is inserted inside a bore perpendicular to the bore where the pin is inserted. The fork-shaped dowel inserts its two prongs into the spaces that are left clear within the bore by the groove of the pin.

[0009] In this way, the pin cannot go out from the bore, but it may freely rotate.

[0010] Furthermore, the pin has a part that is out of the module, this outer part being available to be inserted into another module and locked in the latter through another fork- shaped dowel.

[0011] This is useful for coupling two or more modules in a simple way, in order to make compositions with dissimilar shapes and without any size limitation.

[0012] In fact, several modules, even with different sizes and in different positions, can be coupled together, with substantially infinite modularity and extensibility and ease of use. The shapes and compositions that can be made depend also on the available number of pieces (that is, modules, pins, dowels).

[0013] A coupling system according to the present disclosure allows to implement both rotary joints (using a single pin) and fixed joints (using two pins); this allows a high versatility together with a relevant ease of use.

[0014] In one embodiment, the rotary or fixed joint can be implemented using a single pin, depending on the extent of insertion of the dowels.

[0015] The various pieces or components can be made of various materials (e.g., of wood); there are no size limitations for the pieces (which then may be more or less large) and the various pieces can have different shapes.

[0016] A main use is in the field of toys, especially educational toys for children, but uses in other fields are possible as well.

[0017] In one embodiment, the module has a parallelepiped shape. Through-bores are made on its faces in a number equal to the number of squares, having a side equal to the shorter edge, that can be inscribed on the surface of the face.

[0018] In other words, the central body of each module or block is constituted by a parallelepiped of variable length according to multiples of the length of the shorter edge: considering the square that forms the smaller base, such a square is repeated for two, three or more times on the lateral faces. At the center of each real or virtual square, there is a bore having a diameter equal to the maximum diameter of a grooved pin, which can have two or more grooves.

[0019] Further advantages, characteristic features and modes of use of the subject of the present disclosure will be made evident in the following detailed description of embodiments thereof, given by way of example and not for limitative purposes. However, it is evident that each embodiment of the subject of the present disclosure may have one or more of the advantages listed above; in any case, it is not required for each embodiment to concomitantly have all the listed advantages.

[0020] Reference will be made to the figures of the annexed drawings, wherein:

- Figure 1 shows an exploded perspective view of an example of a coupling system according to the present disclosure;
- Figure 2 shows a perspective view of the coupling system of Figure 1, in a coupled condition;
- Figure 3 shows a plan view of a module of the coupling system of Figure 1;
- Figure 4 shows a perspective view of a pin of the

coupling system according to the present disclosure;
- Figure 5 shows a side view of the pin of Figure 4;
- Figure 6 shows a plan view of the pin of Figure 4;
- Figure 7 shows a perspective view of a dowel of the coupling system according to the present disclosure;
- Figure 8 shows a side view of the dowel of Figure 7;
- Figure 9 shows a first plan view of the dowel of Figure 7;
- Figure 10 shows a second plan view of the dowel of Figure 7;
- Figure 11 shows a perspective view of a second embodiment of a module of the coupling system according to the present disclosure;
- Figure 12 shows a plan view of the module of Figure 11;
- Figure 13 shows a perspective view of a third embodiment of a module of the coupling system according to the present disclosure;
- Figure 14 shows a plan view of the module of Figure 13;
- Figure 15 shows a perspective view of two modules, one of which according to a fourth embodiment, joined together by a pin and devoid of any dowel;
- Figure 16 shows a second perspective view of the modules of Figure 15;
- Figure 17 shows a perspective view of a coupling system according to the present disclosure, wherein only one module is shown;
- Figure 18 shows a perspective view of two modules that are coupled and partially rotated;
- Figure 19 shows a perspective view of a second embodiment of a dowel of the coupling system;
- Figure 20 shows a perspective view of a composition according to the present disclosure, in an assembled condition;
- Figures 21 to 23 show perspective views of a detail of a piece of furniture, during assembling steps employing a coupling system according to the present disclosure;
- Figure 24 shows a perspective view of a piece of furniture that includes a coupling system according to the present disclosure.

[0021] With reference to the figures, a coupling system according to the present disclosure is shown in Figure 1 in an uncoupled condition and in Figure 2 in a coupled condition. The coupling system as a whole is denoted by reference number 1.

[0022] The modules of the present disclosure are generally denoted by reference number 10. These modules 10 are blocks, elements or bodies that, thanks to said coupling system, are coupled together to form a composition.

[0023] By way of example and in order to illustrate the operational principle of the coupling system 1 in a simple way, the modules shown in Figures 1 and 2 have a cubic shape and are identical with each other. A first module is specifically denoted by reference number 11 and a second module is specifically denoted by reference number 12.

[0024] In addition to the two modules 11, 12, the coupling system 1 also comprises a grooved pin 4, a first fork-shaped dowel 51 and a second fork-shaped dowel 52. Each module 11, 12 is a body that has at least a first face 21 and a second face 22, the faces being perpendicular to each other.

[0025] Specifically, if the module is a cube or a parallelepiped, it has further faces 23, 24, 25, 26 that are parallel or perpendicular to said faces 21, 22.

[0026] A first bore 31 opens on the first face 21 and extends perpendicular to the first face 21 into the body of the module 11, 12. A second bore 32 opens on the second face 22 and extends perpendicular to the second face 22 into the body of the module 11, 12. The bores 31, 32 are made in such positions that the second bore 32 intersects the first bore 31. The two bores 31, 32 are perpendicular to each other and communicating at their intersection.

[0027] Specifically, the bores 31, 32 have a circular cross- section, i.e. they are cylindrical bores and open onto the center of the respective face 21, 22.

[0028] Moreover, in the shown embodiment, each bore 31, 32 is a through- bore that extends between one face and the opposite face, passing through the body of the module 11, 12 and opening on the faces at both sides. The first bore 31 extends between the first face 21 and the face 24 opposite to the latter; the second bore 32 extends between the second face 22 and the face 25 opposite to the latter. Additionally, in the shown embodiment, each module 11, 12 includes a third bore 33 that opens on a third face 23 (perpendicular to the first face 21 and to the second face 22) and extends perpendicular to the third face 23, perpendicularly intersecting the other two bores 31, 32. Specifically, the third bore 33 is a through- bore that extends between the third face 23 and the face 26 opposite to the latter.

[0029] Therefore, each face of the module 11, 12 has a bore that opens on it and extends into the body of the module 11, 12, so as to intersect and communicate with the bores of the other faces.

[0030] In particular, the bores 31, 32, 33 are identical with each other and have the same diameter.

[0031] The pin 4 has an elongated shape; each end section of the pin 4 is provided with a respective grooved portion 41, 42.

[0032] In particular, such a grooved portion 41, 42 is a section of the pin 4 that has a thickness or diameter D41 that is less than the thickness or diameter D4 of the rest of the body of the pin 4; furthermore, the grooved portion 41, 42 is bounded at the sides by shoulders 44.

[0033] Specifically, the pin 4 has a cylindrical shape having a maximum diameter (i.e., the diameter D4 of the non- grooved section) that is equal to the diameter D30 of the bores 31 (and of the other bores 32, 33) . The grooved portion 41, 42 is a section with a diameter that is less than the maximum diameter, thus defining a

groove or a recess.

[0034] The grooved pin 4 is adapted to be inserted, with a first end 4a, into a bore (for example the first bore 31) of the first module 11 and, with a second end 4b, into a bore (for example the first bore 31) the second module 12. When the pin 4 is inserted inside a bore with one end, the respective grooved portion 41, 42 is positioned in the region of intersection with the other bore (for example, the second bore 32 of the same module), which is perpendicular to and communicating with the bore 31 in which the pin 4 is inserted.

[0035] The length and shape of the grooved pin 4 are selected in such a way that, when the grooved pin 4 is inserted inside the first bores 31 of both modules 11, 12 and the first faces 21 of the two modules 11, 12 are touching each other, both the grooved portions 41, 42 are located in the regions of intersection with the respective second bores 32; to be more specific, each grooved portion 41, 42 can be viewed through the respective second bore 32 and is centered with respect to it.

[0036] Each fork-shaped dowel 51, 52 has two prongs 54, 55 and a cavity 56 between them.

[0037] Specifically, each fork- shaped dowel 51, 52 has a substantially cylindrical shape having a diameter D5 that is equal to the diameter D30 of the bores 32 (and of the other bores 31, 33) . The cavity 56 has a height H56 that is equal to the thickness or diameter D41 of the grooved portion 41, 42 of the grooved pin 4.

[0038] The fork-shaped dowel 51, 52 is adapted to be inserted into said other bore (for example, the second bore 32) of the respective module 11, 12, i.e. into the bore through which the respective grooved portion 41, 42 can be viewed. In other words, the first fork-shaped dowel 51 is inserted into the second bore 32 of the first module 11 and the second fork-shaped dowel 52 is inserted into the second bore 32 of the second module 12.

[0039] The prongs 54, 55 of the fork-shaped dowel 51, 52 are intended to be inserted into spaces within the bore 32, said spaces being left clear by the respective grooved portion 41, 42 of the pin 4. In substance, the grooved portion 41, 42 is housed between the prongs 54, 55 and into the cavity 56. The prongs 54, 55 and the grooved portion 41, 42 are transverse to each other.

[0040] Therefore, the fork- shaped dowel 51, 52 is configured to cooperate with the respective grooved portion 41, 42 to prevent a slipping of the pin 4 out of the respective module 11, 12. In substance, the prongs 54, 55 interfere with the shoulders 44 of the grooved portion 41, 42 and, thanks to such an interference, they prevent a movement of the pin 4 both in the direction of pulling out from the bore 31 and in the direction of further insertion into the bore 31.

[0041] In other words, the first fork-shaped dowel 51 is inserted into the second bore 32 of the first module 11 to keep the pin 4 in position relative to the first module 11; the second fork-shaped dowel 52 is inserted into the second bore 32 of the second module 12 to keep the pin 4 in position relative to the second module 12.

[0042] The fork-shaped dowel 51, 52 fits interlocking with the pin 4 in a removable manner. For example the fork-shaped dowel 51, 52 can be removed by pushing on it through the through-bore 32, acting from face opposite to the face of insertion.

[0043] Thus, such a coupling system 1 allows to couple and join the first module 11 to the second module 12. The two modules 11, 12 keep joined together, thanks to the cooperation between the pin 4, the fork- shaped dowels 51, 52 and the bores 31, 32. At least one of the fork-shaped dowels 51, 52 should be removed in order to separate the two modules 11, 12 from each other.

[0044] The operations of coupling and uncoupling may be manually carried out, without the need for tools.

[0045] The components, in particular the fork-shaped dowels 51, 52, can be designed with such a size that they are subjected to a slight elastic deformation during insertion into the respective bore. This is useful for producing a frictional force between the fork-shaped dowels 51, 52 and the pin 4 and / or the walls of the bores 32, so as to prevent the risk of an accidental slipping of the fork-shaped dowels 51, 52 out of the respective bores 32 and, therefore, the risk of an unwanted uncoupling of the modules 11, 12.

[0046] In the shown embodiment, the pin 4, the grooved portions 41, 42 and the bores 31 are cylindrical. Thus, the pin 4 can rotate around its longitudinal axis 400 both relative to the modules 11, 12 and relative to the fork-shaped dowels 51, 52. Therefore, the coupling system 1 allows a rotation of the first module 11 relative to the second module 12 around the longitudinal axis 400 of the pin 4.

[0047] As shown in the figures, the pin 4 and the fork-shaped dowels 51, 52 are designed with such a size that, when the coupling system 1 is mounted and the fork-shaped dowels 51, 52 are inserted inside the respective bores at the end of stroke, the pin 4 has circular end faces 48 that are substantially flush with the respective module faces 24 that are opposite to the faces 21 into which the pin 4 is inserted, and each fork-shaped dowel 51, 52 has a circular tail face 58 that is flush with the respective module face 22 into which the dowel 51, 52 is inserted. In other words, these circular faces 48, 58 close the respective bore and form a continuity with the respective face of the module.

[0048] In the shown embodiment, the bores 31, 32, 33 are identical with each other (and are also identical in the first module 11 and second module 12), the fork-shaped dowels 51, 52 are identical with each other and the grooved pin 4 has symmetrically-arranged ends 4a, 4b and grooved portions 41, 42. Therefore, the bores, the dowels and the pin ends are interchangeable, allowing a high versatility in assembling. The pin 4 can be inserted into one bore at choice from the bores 31, 32, 33, and the fork-shaped dowel 51, 52 can be inserted into another intersecting bore 32, 33, 31 chosen by the user.

[0049] For example, the modules 11, 12 are made of wood. They may be made of other materials as well, for

example plastic or metal.

[0050] Some dimensional details of an illustrative embodiment are provided below.

[0051] Each module 11, 12 has a cubic shape with a side L10 of 32 mm and bores with a diameter D30 of 16 mm at the center of the respective face.

[0052] The grooved pin 4 has a substantially cylindrical shape, with a diameter D4 of 15.7 mm and a length L4 of 64 mm. The grooved portions 41, 42 have a diameter D41 of 8 mm and a length L41 of 14 mm. A central section 49 of the pin 4 has the diameter D4 of the pin and a length L49 of 12 mm. The shoulders 44 are frustoconical surfaces with a length L44 of 3 mm and an angle α44 of 37°. End collars 46 have the diameter D4 of the pin and a length L46 of 6 mm.

[0053] Each dowel 51, 52 has a substantially cylindrical shape, with a diameter D5 of 16 mm and a length L5 of 29 mm. Each prong 54, 55 has a thickness S54 of 4 mm and a length L54 of 14 mm. The cavity 56 has a height H56 of 8 mm and a length L56 of 18 mm, comprising a half-cylindrical bottom 560 with a diameter of 8 mm. The tail section of the dowel 51, 52 has a length L50 of 11 mm.

[0054] Besides the cubic form, which has been given as an example to illustrate the coupling system 1, the modules 10 may have different shapes and lengths.

[0055] For example, the modules 10 may have a parallelepiped shape, where the first face 21 and second face 22 comprise a plurality of respective first bores 31 and second bores 32. Each first bore 31 intersects and communicates with a respective second bore 32, as previously described. Furthermore, a third bore 33 extends from the third face 33 along the entire length of the module 10, intersecting and communicating with all the first bores 31 and second bores 32. In particular, all bores 31, 32, 33 are through-bores, i.e. they extend between one face and the opposite face.

[0056] Specifically, all bores 31, 32, 33 have the same diameter and then they can equally house either a pin 4 or a fork- shaped dowel 51, or stay free, depending on the composition to be made.

[0057] In one embodiment shown in Figures 11 and 12, two first bores 31 and two second bores 32 are provided. In one embodiment shown in Figures 13 and 14, four first bores 31 and four second bores 32 are provided. In any case, it is evident that the modules 10 may have any number of bores and any shape, size and length. For example, the bores on one face may be arranged along a single row, or along parallel rows, or according to another arrangement. The modules may have a shape that is different from the parallelepiped, for example they may have a shape with an angle or a bend, as shown in Figures 15 and 16.

[0058] In the shown embodiments, the sides of the parallelepiped have lengths that are multiples of the length L10 of the shorter edge.

[0059] For example, the smaller base 23 with only one bore 33 is a square and has a side length L10 of 32 mm. The longer edge of the parallelepiped has a length L15 of 64 cm (twice the shorter edge) in the module with two first bores 31, of 128 cm (four times the shorter edge) in the module with four first bores 31. All bores have a diameter D30 of 16 cm and their centers on the same face are spaced from each other by a distance L30 of 32 cm, that equals the length L10 of the shorter edge. The centers of the bores at the face ends are spaced from the face edge by a distance L3 of 16 cm, that equals half the length L10 of the shorter edge.

[0060] In other words, the square that forms the smaller base 23 (or, more precisely, the square that includes a single bore) is repeated along the side faces 21, 22 for a number of times that equals the number of bores that are provided on the side face itself. A bore with a diameter equal to the maximum diameter of the grooved pin 4 and of the fork-shaped dowel 51, 52 is provided at the center of each (real or virtual) square. In particular, the diameter D30 of the bore equals half the length L10 of the shorter edge.

[0061] Figure 18 shows a coupling between two parallelepiped-shaped modules 10, each having a plurality of bores on the longer side faces. The two modules 10 are rotated relative to each other around the axis 400.

[0062] In fact, the coupling using a single pin 4 is a rotary joint that allows the rotation of one module with respect to the other module. The free pairs of communicating bores of each module 10 (or, in any case, the pairs that are free for at least a length allowing the insertion and the cooperation of a grooved pin and a fork-shaped dowel) may be used for coupling other modules. Several modules, even with different sizes and in different positions, can then be coupled.

[0063] Two pins / coupling systems in different bores on the same faces can be used in order to obtain a non-rotating coupling between two modules.

[0064] Alternatively, a non- rotating coupling using a single pin can be obtained by designing the pin 4 with such a size that the grooved portions 41, 42, when they are inserted into the first bore 31 during the assembling procedure described above, go to take a slightly out- of-center position with respect to the respective second bore 32, wherein the shoulder 44a, which is closer to the respective end 4a, 4b, protrudes into the second bore 32 more than the other shoulder 44b.

[0065] During the insertion of the fork-shaped dowel 51, 52, the protruding shoulder 44a is moved sideward by the dowel itself and, therefore, the pin 4 pulls the other module 10, forcing the first faces 21 of the two modules against each other. The friction between the faces 21 prevents (or at least hinders) the mutual rotation between the two modules 10. Furthermore, the dowel is retained inside the bore with a greater force as well, thus reducing the risk of an accidental uncoupling.

[0066] The fork-shaped dowels 51, 52 can be made in such a way that the above-described effect occurs only when the dowel is at the end of stroke inside the respective bore. Therefore, according to a user's choice, a complete insertion of the dowel prevents the mutual rotation

of the modules, whereas an incomplete insertion allows the mutual rotation.

[0067] Having a kit or a set composed of a plurality of modules 10 (mutually compatible and interchangeable, in particular having the same conformation based on a square repeated on the faces), a plurality of pins 4 and a plurality of fork-shaped dowels 51, 52, the modules 10 can be associated according to a variety of configurations and modes, in order to make a large number of different mounted compositions. Obviously, only a share of the plurality of modules may be used for each composition, selecting the modules that are suitable (in number and / or shape) for the composition to be made.

[0068] The number of possible compositions is increased by a large number of modules 10 and / or by providing modules 10 with different lengths and shapes.

[0069] In order to increase the possibility of composing the modules in different ways, pins 4 with different lengths (for example, having a longer central section 49, as shown in Figure 19, to completely pass through a through-bore of one or more modules) and /or with more than two grooved portions 41, 42 may be provided.

[0070] This kit is especially useful for the toy field, especially for educational toys for children.

[0071] For example, a composition 8 that represents a little man or a robot is shown in Figure 20, where modules 10 and pins 4 with different lengths have been used. The rotary joints obtained through the coupling system according to the present disclosure allow to implement the articulation of head, arms, legs, feet.

[0072] Another possible field of use is the furniture sector, where the coupling system according to the present disclosure can be used to join together parts of a piece of furniture. For example, Figures 21, 22 and 23 show an assembly of two modules that are an upright or a vertical wall 18 and a horizontal shelf 19. A non-rotating joint is required in this case and then at least two pins 4 in different bores 31 on the same faces 21 are used.

[0073] Thus, a piece of furniture 85, such as a table or a shelf shown in Figure 24, is obtained.

[0074] The subject of the present disclosure has been hereto described with reference to embodiments thereof. It is understood that other embodiments might exist, all relating to the same inventive core and falling within the protection scope of the claims hereinafter.

Claims

1. A coupling system (1) of modules (10, 11, 12, 18, 19), comprising at least a first module (10, 11, 18), a second module (10, 12, 19), a pin (4), a first fork-shaped dowel (51), and a second fork-shaped dowel (52),
   each of said modules (10, 11, 12, 18, 19) being a body having at least a first face (21), a second face (22) perpendicular to the first face (21), a first bore (31) that opens on the first face (21) and extends perpendicular to the first face (21), and a second bore (32) that opens on the second face (22) and extends perpendicular to the second face (22), intersecting the first bore (31), wherein the first bore (31) and the second bore (32) are perpendicular to and communicating with each other,
   said pin (4) being adapted to be inserted with a first end (4a) into a bore (31, 32) of the first module (10, 11, 18), and with a second end (4b) into a bore (31, 32) of the second module (10, 12, 19), each end section of the pin (4) having a grooved portion (41, 42) that, when the pin (4) is inserted inside a bore (31, 32), is intended to be located in an intersection region with the other bore (32, 31) perpendicular to the bore (31, 32) in which the pin (4) is inserted,
   said first fork-shaped dowel (51) being adapted to be inserted into the other bore (32, 31) of the first module (10, 11, 18) to keep said pin (4) in position, said second fork-shaped dowel (52) being adapted to be inserted into the other bore (32, 31) of the second module (10, 12, 19) to keep said pin (4) in position, each fork-shaped dowel (51, 52) having two prongs (54, 55) intended to be inserted into spaces within the bore (32, 31), said spaces being left clear by the respective grooved portion (41, 42) of the pin (4), the fork-shaped dowel (51, 52) being configured to cooperate with said respective grooved portion (41, 42) to prevent a slipping of the pin (4) out of the respective module (10, 11, 12, 18, 19).

2. The coupling system (1) according to claim 1, wherein the fork-shaped dowel (51, 52) and said respective grooved portion (41, 42) are configured to allow a rotation of the pin (4) around a longitudinal axis (400) of the pin (4), the pin (4) being adapted to rotate between the two prongs (54, 55) to allow a rotation of the first module (10, 11, 18) relative to the second module (10, 12, 19) around said longitudinal axis (400).

3. The coupling system (1) according to claim 1 or 2, wherein each of said modules (10, 11, 12, 18, 19) has a third face (23) perpendicular to the first face (21) and to the second face (22), and a third bore (33) that opens on the third face (23) and extends perpendicular to the third face (23), intersecting the first bore (31) and the second bore (32), said first bore (31), second bore (32) and third bore (33) being perpendicular to and communicating with each other.

4. The coupling system (1) according to any one of claims 1 to 3, wherein said first bore (31), second bore (32) and / or third bore (33) are through-bores that extend between the respective face (21 , 22, 23) of the module (10, 11, 12, 18, 19) and an opposite face (24, 25, 26) of the same module (10, 11, 12, 18, 19).

5. The coupling system (1) according to any one of claims 1 to 4, wherein said first bore (31), second bore (32) and / or third bore (33) are mutually interchangeable, the pin (4) being adapted to be inserted into one bore at choice from these bores (31, 32, 33) and the fork-shaped dowel (51, 52) being adapted to be inserted into an intersecting bore (32, 33, 31) at choice.

6. The coupling system (1) according to any one of claims 1 to 5, wherein said bores (31, 32, 33) are cylindrical bores, and wherein said pin (4) and said fork-shaped dowels (51, 52) have a substantially cylindrical shape.

7. The coupling system (1) according to any one of claims 1 to 6, wherein the first face (21) and the second face (22) of at least one of said modules (10, 11, 12, 18, 19) comprise a plurality of said first bores (31) and a plurality of said second bores (32), respectively, each first bore (31) being intersecting and communicating with a respective second bore (32).

8. The coupling system (1) according to claim 7, wherein said module (10, 11, 12, 18, 19) has a parallelepiped shape, a longer edge of the parallelepiped having a length (L15) that is a multiple of the length (L10) of a shorter edge of the parallelepiped, said first face (21) and second face (22) being composed by the repetition of a square having a side equal to the length (L10) of the shorter edge, a respective bore (31, 32) being at the center of each square.

9. The coupling system (1) according to claim 7 or 8, wherein at least a pair of first bore (31) and second bore (32) is not engaged by said pin (4) and is adapted to receive a second pin (4) and a third fork-shaped dowel (51, 52) for a coupling with a third module (10, 11, 12, 18, 19) or for implementing a second coupling between the first module (10, 11, 18) and the second module (10, 12, 19), said second coupling being adapted to prevent a rotation of the first module (10, 11, 18) relative to the second module (10, 12, 19).

10. The coupling system (1) according to any one of claims 1 to 9, wherein the coupling is of a removable type, the fork-shaped dowel (51, 52) being adapted to be slipped out of the respective bore (31, 32) to release the pin (4) and allow the slipping of the pin (4) out of the respective module (10, 11, 12, 18, 19).

11. A kit comprising a plurality of modules (10, 11, 12, 18, 19), a plurality of pins (4) and a plurality of fork-shaped dowels (51, 52), the modules (10, 11, 12, 18, 19) of said plurality being associable with each other by means of a coupling system according to any one of claims 1 to 10, wherein said modules (10, 11, 12, 18, 19) can be associated with each other according to a variety of configurations to obtain a plurality of different compositions (8).

12. The kit according to claim 11, wherein said plurality of modules (10, 11, 12, 18, 19) comprises modules having a different size and a different number of bores (31, 33, 33).

13. A toy (8) comprising a kit according to claim 11 or 12.

14. A piece of furniture (85) comprising a first module (18) and a second module (19), said first module (18) and second module (19) being coupled to each other by means of a coupling system according to any one of claims 1 to 10.

15. A method for coupling modules (10, 11, 12, 18, 19), each module (10, 11, 12, 18, 19) being a body having at least a first face (21), a second face (22) perpendicular to the first face (21), a first bore (31) that opens on the first face (21) and extends perpendicular to the first face (21), and a second bore (32) that opens on the second face (22) and extends perpendicular to the second face (22), intersecting the first bore (31), wherein the first bore (31) and the second bore (32) are perpendicular to and communicating with each other,
comprising the steps of:

- providing a first module (10, 11, 18) and a second module (10, 11, 18);
- providing a pin (4) having ends (4a, 4b) adapted to be inserted into bores (31, 32) of the modules (10, 11, 12, 18, 19), each end section of the pin (4) having a grooved portion (41, 42);
- providing a pair of fork-shaped dowels (51, 52) adapted to be inserted into the bores (32, 31) of the modules (10, 11, 12, 18, 19), each fork-shaped dowel (51, 52) having two prongs (54, 55);
- inserting a first end (4a) of the pin (4) into a bore (31, 32) of the first module (10, 11, 18), in such a way that the respective grooved portion (41) is in a region intersecting the other bore (32, 31) perpendicular to the bore (31, 32) in which the pin (4) is inserted;
- inserting a fork-shaped dowel (51) into the other bore (32, 31) of the first module (10, 11, 18), in such a way that the two prongs (54, 55) are inserted into spaces within the bore (32, 31), said spaces being left clear by the respective grooved portion (41), the fork-shaped dowel (51, 52) cooperating with said respective grooved portion (41) to keep the pin (4) in position and to prevent a slipping of the pin (4) out of the first module (10, 11, 18);
- inserting a second end (4b) of the pin (4) into a bore (31, 32) of the second module (10, 12,

19), in such a way that the respective grooved portion (42) is in a region intersecting the other bore (32, 31) perpendicular to the bore (31, 32) in which the pin (4) is inserted;

- inserting a fork-shaped dowel (52) into the other bore (32, 31) of the second module (10, 12, 19), in such a way that the two prongs (54, 55) are inserted into spaces within the bore (32, 31), said spaces being left clear by the respective grooved portion (42), the fork-shaped dowel (52) cooperating with said respective grooved portion (42) to keep the pin (4) in position and to prevent a slipping of the pin (4) out of the second module (10, 12, 19).

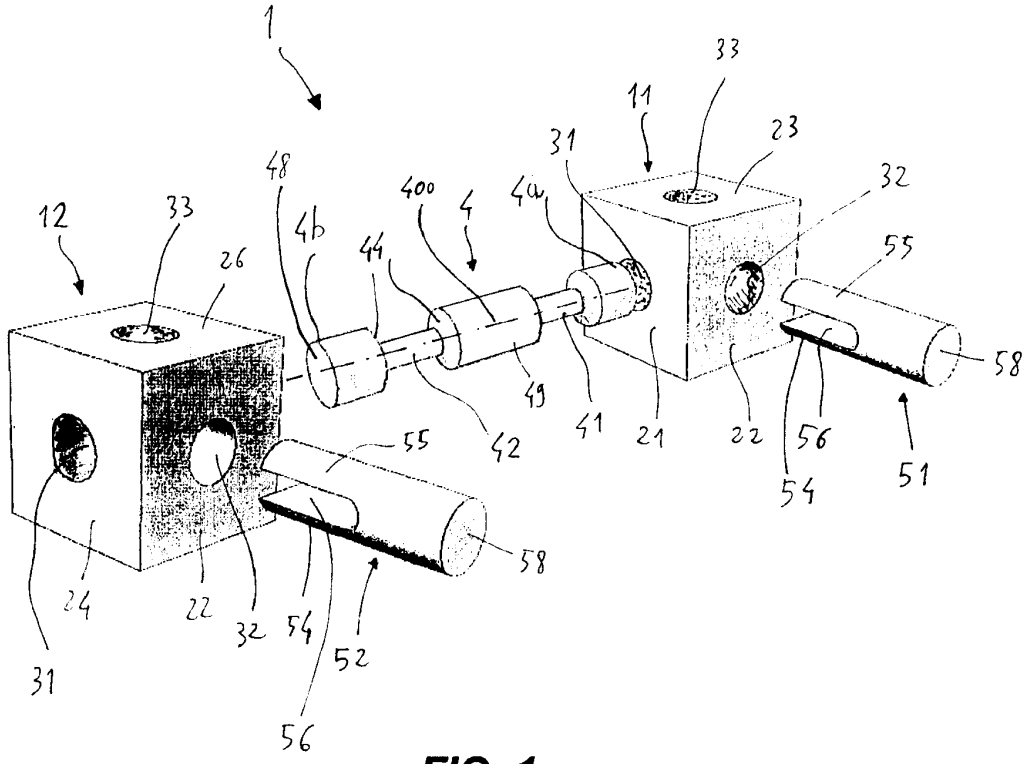


FIG. 1

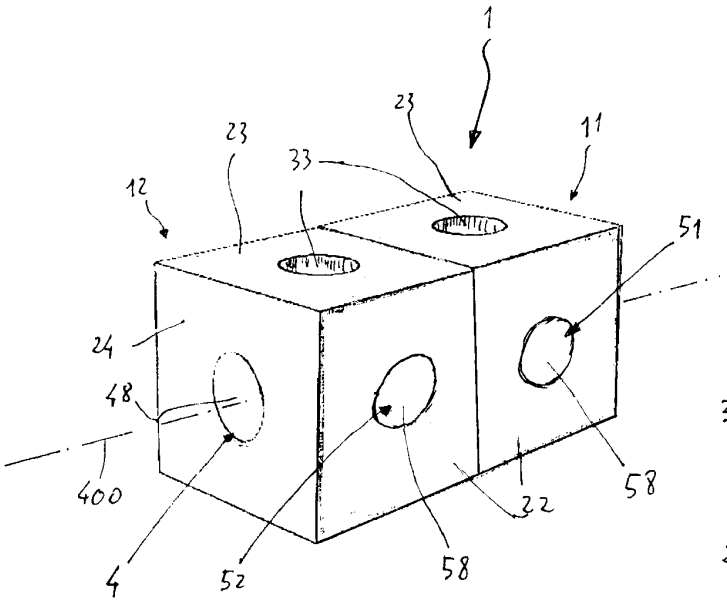


FIG. 2

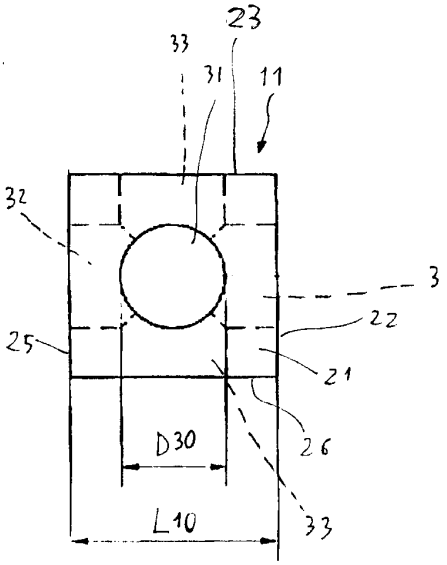
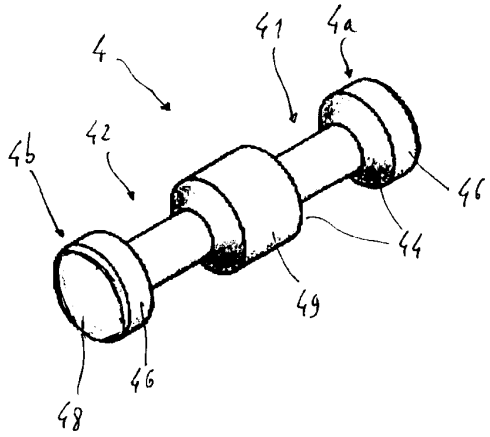


FIG. 3



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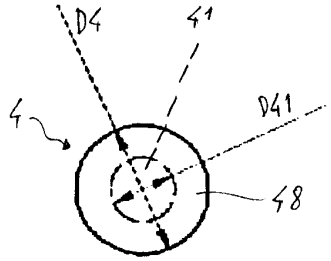
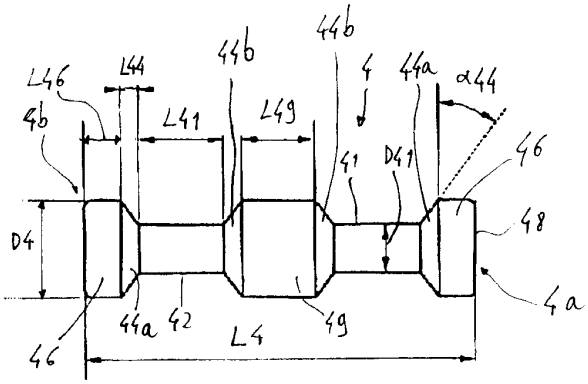


FIG. 5



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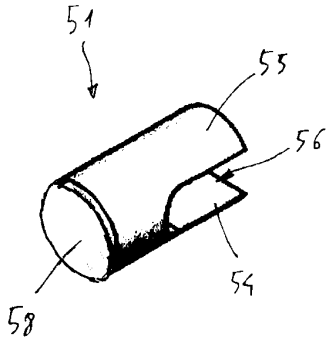

FIG. 7

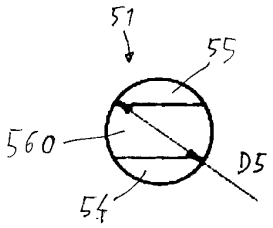

FIG. 8

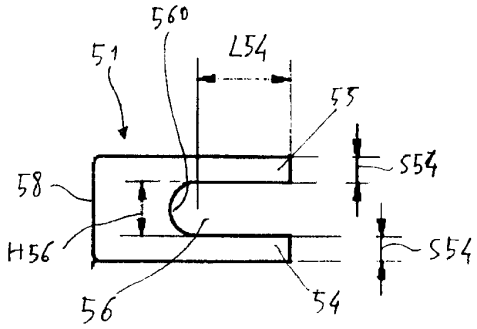

FIG. 9

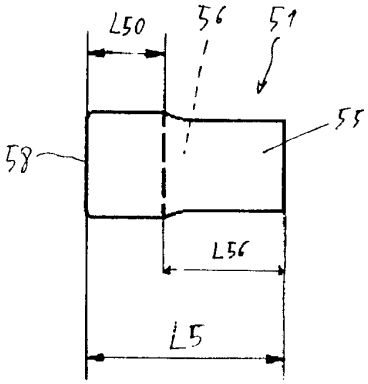

FIG. 10

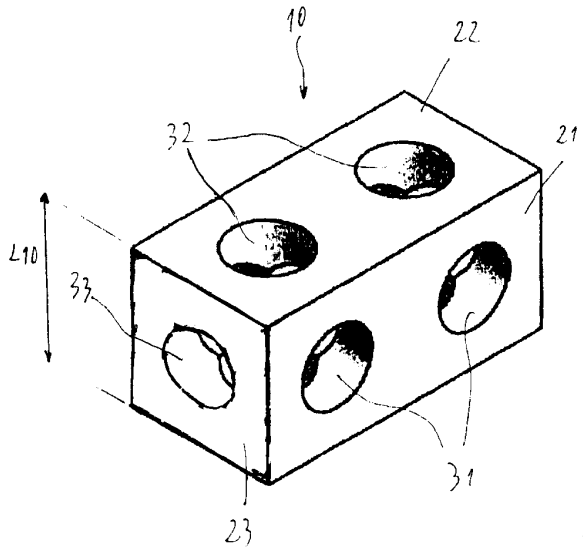

FIG. 11

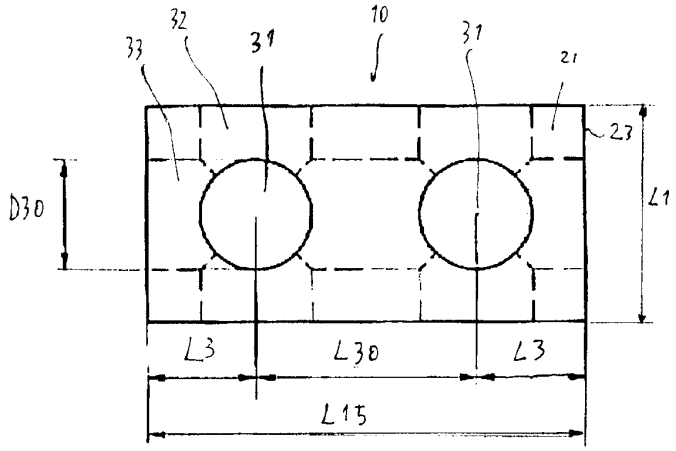

FIG. 12

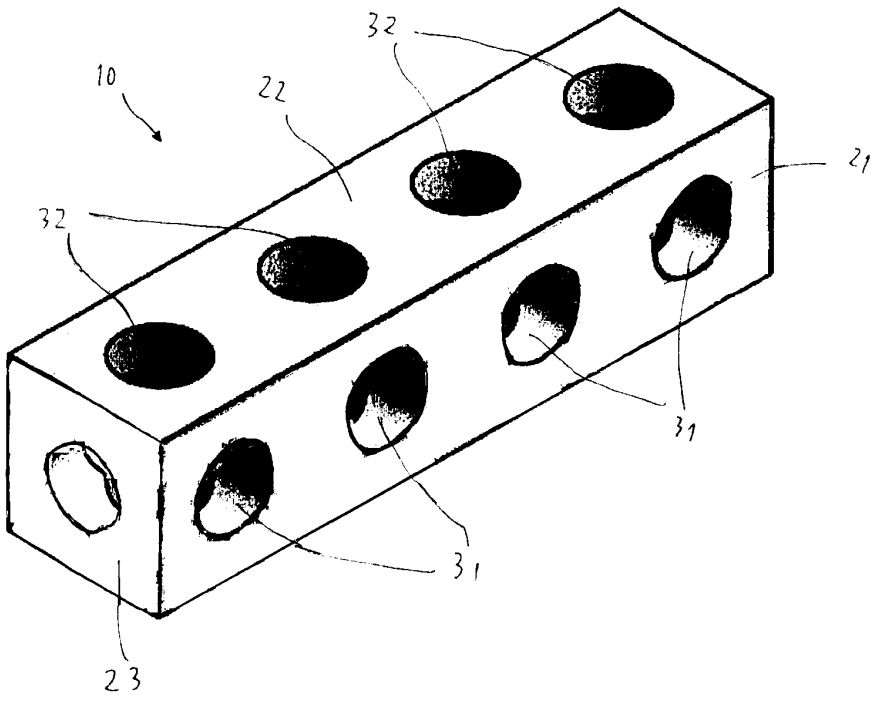

FIG. 13

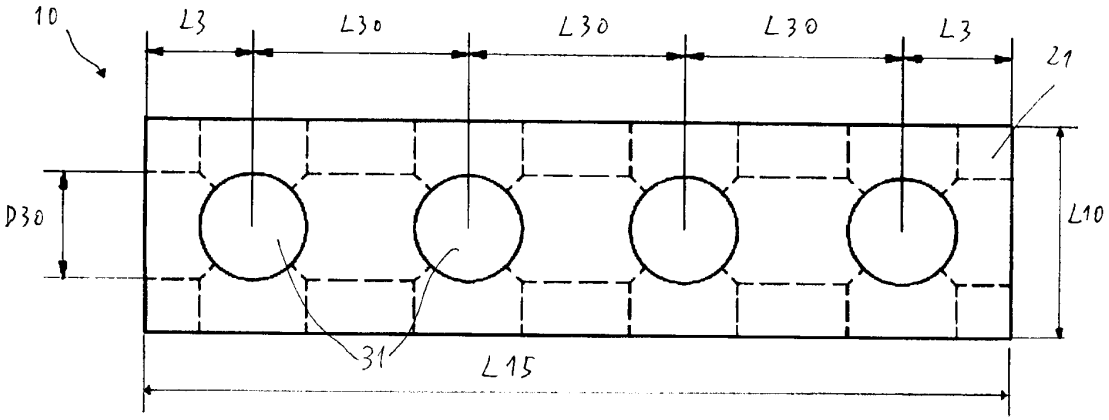

FIG. 14

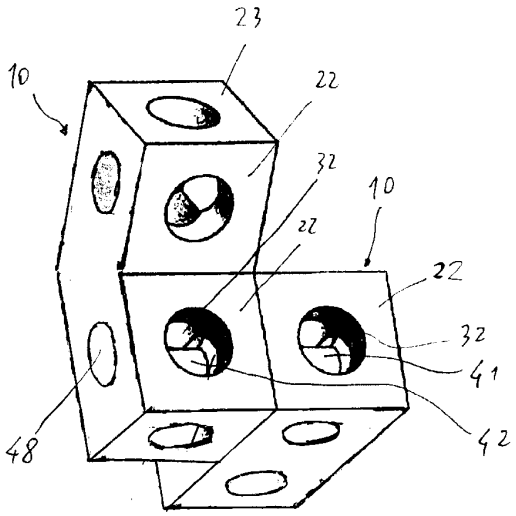

FIG. 15

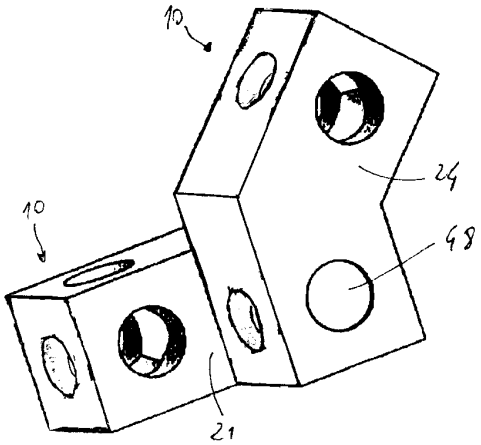

FIG. 16

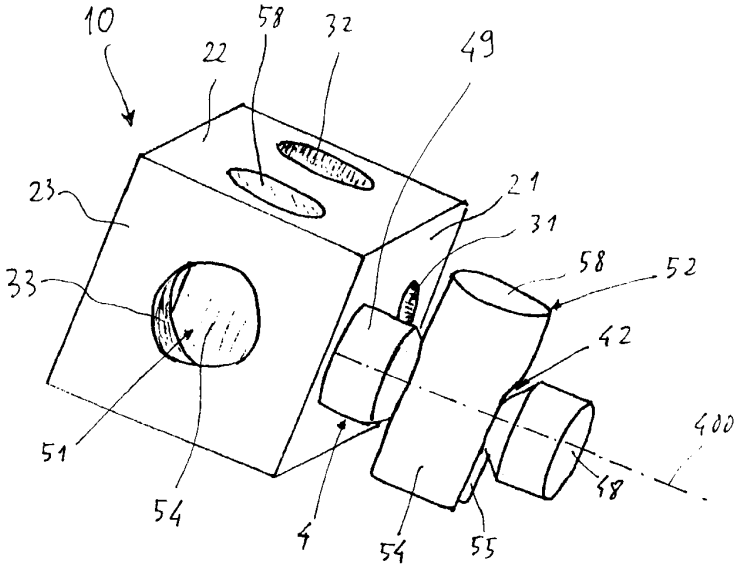

FIG. 17

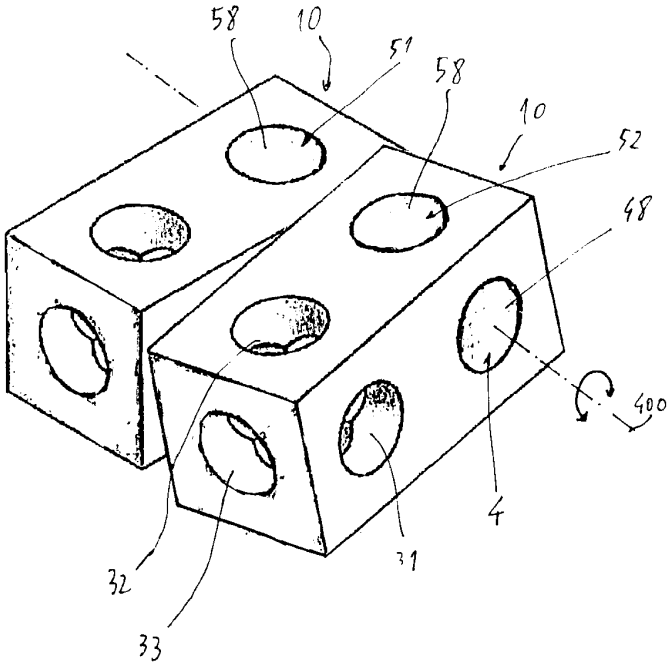

FIG. 18

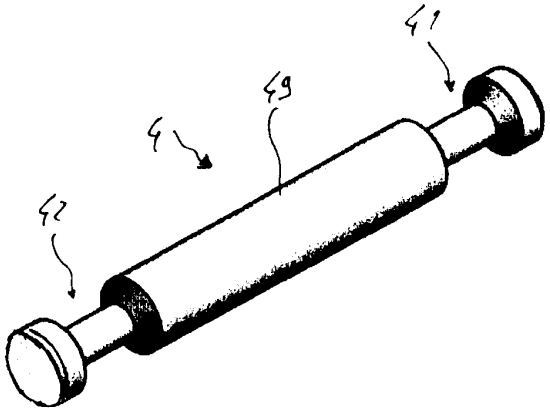

FIG. 19

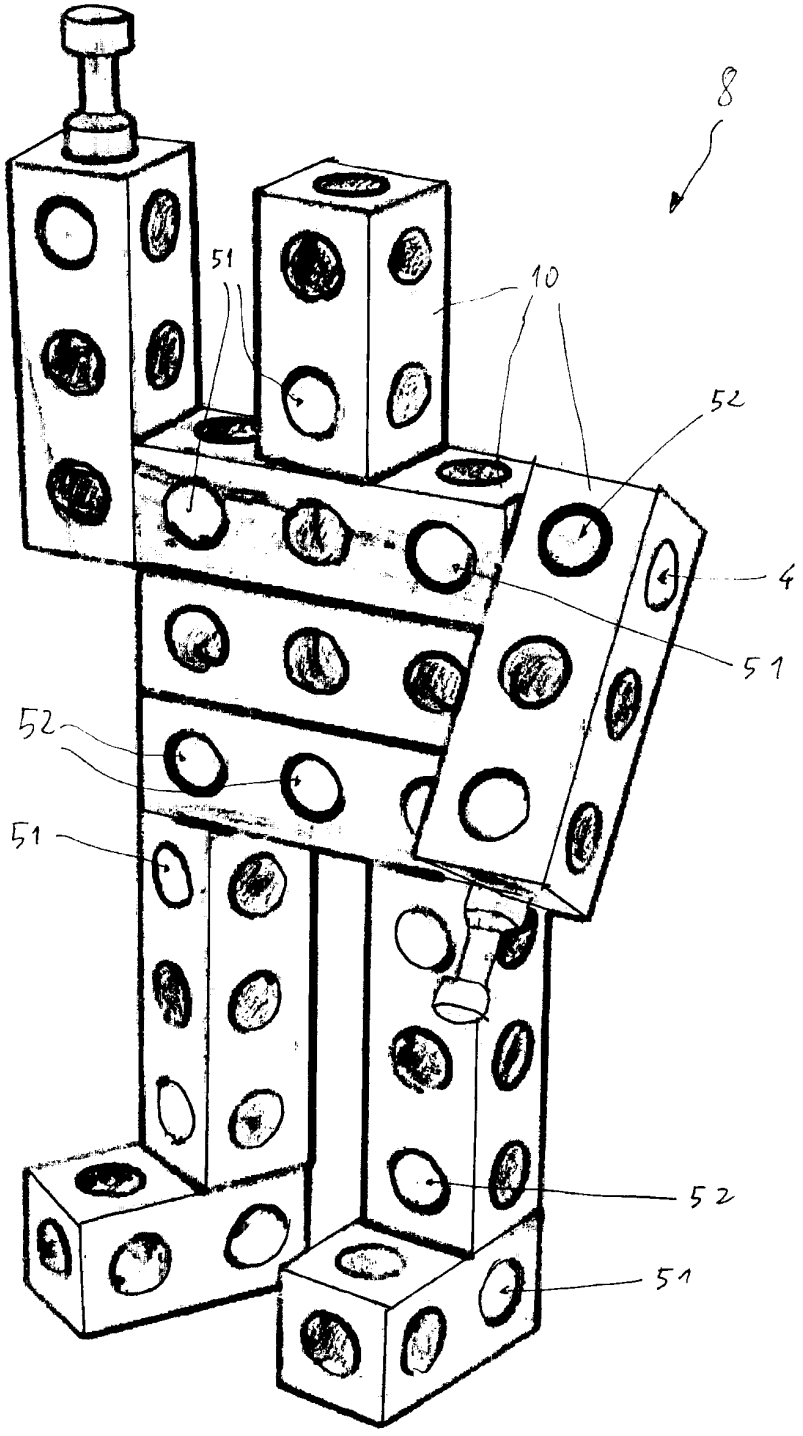

FIG. 20

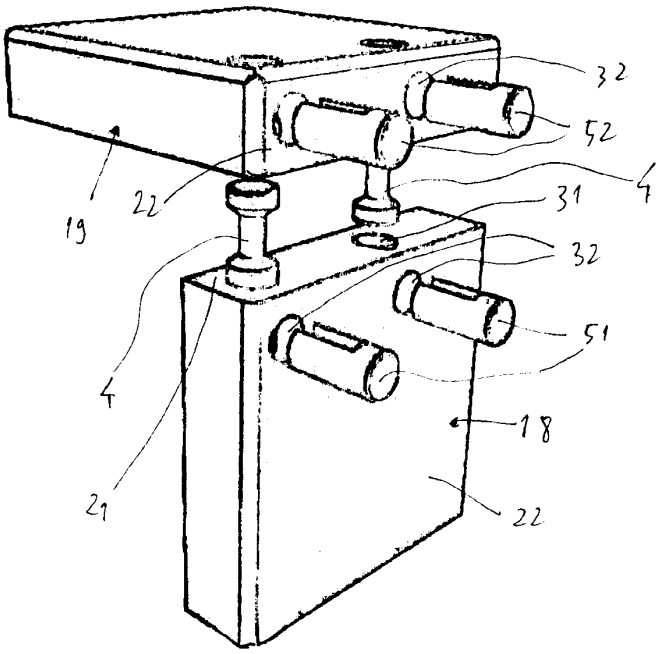

FIG. 21

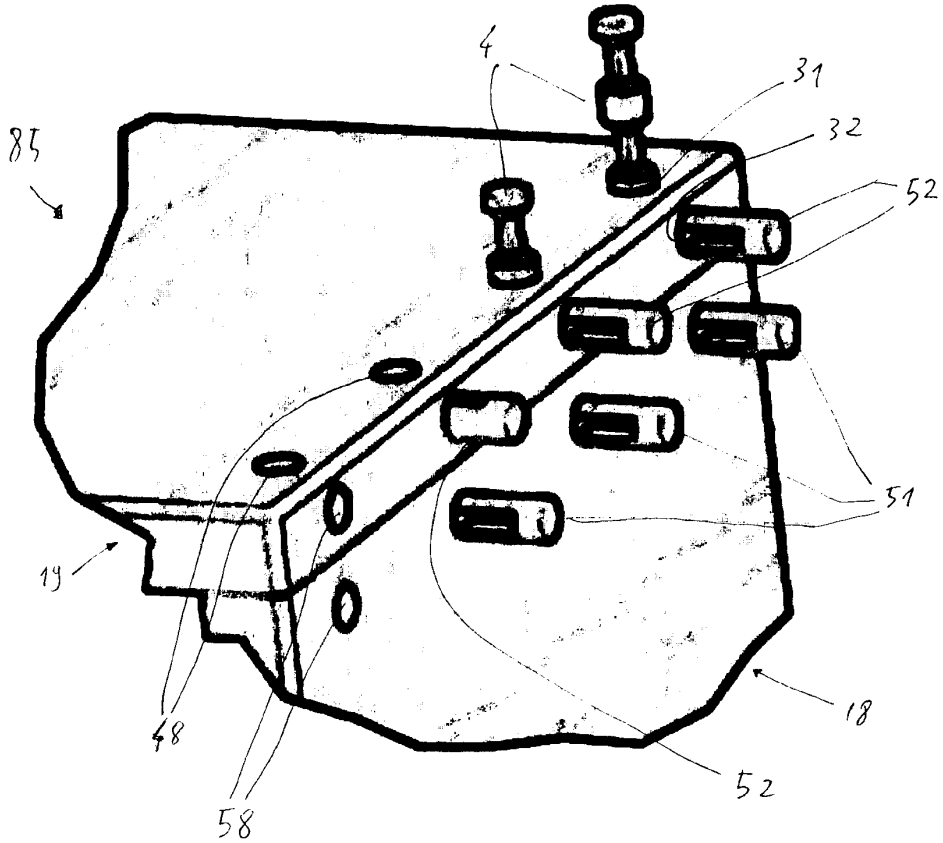

FIG. 22

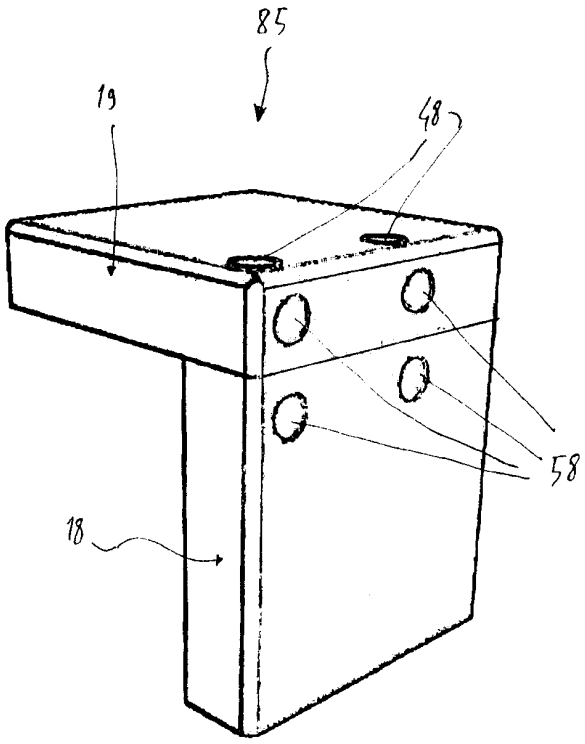

FIG. 23

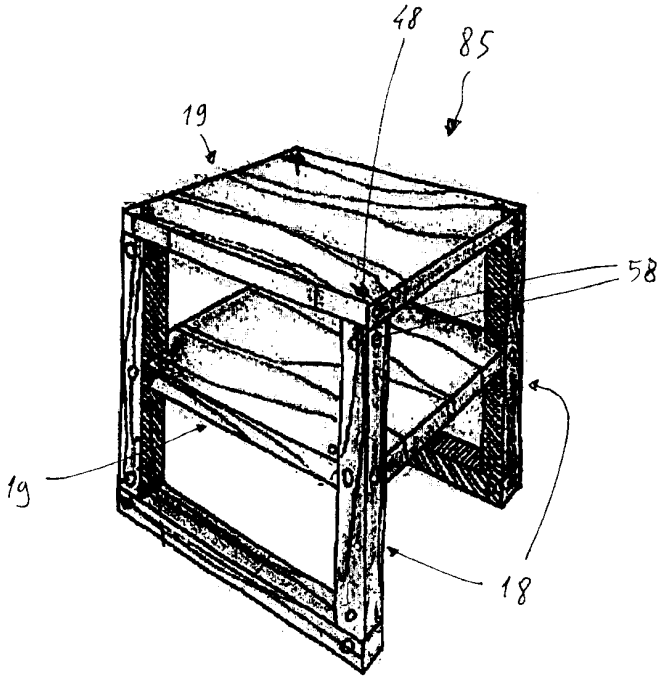

FIG. 24

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EUROPEAN SEARCH REPORT

Application Number
EP 13 16 2614

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	GB 2 393 136 A (WARNER TIMOTHY JOHN [GB]) 24 March 2004 (2004-03-24) * page 29, line 1 - page 30, line 8; figures *	1-15	INV. A63H33/10
A	GB 633 652 A (PREMO RUBBER COMPANY LTD; ARNOLD LEVY) 19 December 1949 (1949-12-19) * page 2, line 96 - page 3, line 82; figures *	1-15	
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A	CN 2 790 555 Y (XU ZHEMING [CN]) 28 June 2006 (2006-06-28) * abstract; figures *	1-15	

TECHNICAL FIELDS SEARCHED (IPC)

A63H
E04B
F16B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	10 July 2013	Lucas, Peter

CATEGORY OF CITED DOCUMENTS

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1 EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 13 16 2614

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82