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Claims 16 to 25 are deemed to be abandoned due to non-payment of the claims fees (Rule 45(3) EPC).

(54) FURNITURE MODULE

(57) Furniture module (10) for resting on a support surface (12) in a first position of the furniture module (10), the module comprising:
- a first transverse panel (14),
- a counterbalance element (16),
- a pair of support structures (18) spaced apart by the transverse panel (14),
wherein the support structures (18) are configured for supporting the transverse panel (14) in a position a distance D above the support surface (12),
wherein the furniture module (10) has a centre of mass, wherein the counterbalance element (16) is configured for, when a predetermined weight is applied to the transverse panel (14) and when the furniture module (10) is pivoted a predetermined angle about a pivot line (20), maintaining the combined centre of masses of the furniture module (10) and the predetermined weight, respectively, behind a vertical plane (22) that contains the pivot line (20), such that the furniture module (10), with the predetermined weight applied and when pivoted a predetermined angle about the pivot line (20), will not overturn, wherein the contribution of the counterbalance element (16) to maintaining the combined centre of masses on said side of the vertical plane (22) is equal to or exceeds the contribution by the furniture module (10) less the counterbalance element (16) by a factor of 1.5 or by a factor of 2 or by a factor of 2.2 or by a factor of 3 or more.

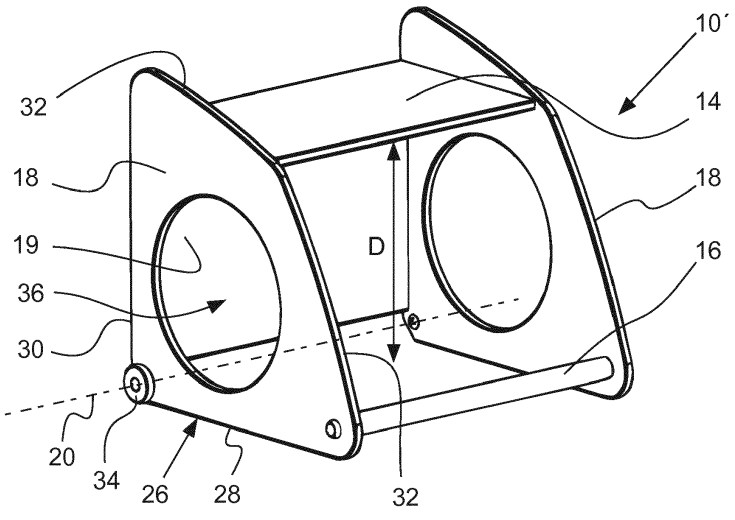

Fig. 1

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Description

[0001] The current invention relates to a furniture module.

[0002] Additionally, the current invention relates to a furniture system.

[0003] A related, but independent invention is provided in the form of a furniture kit comprising a furniture module and an accessory and a co-operating connecting means, wherein the connecting means are releasable, wherein one half of the connecting means is located on the furniture module and wherein the other half of the connecting means located on the accessory.

Background

[0004] In relation to furniture and more specifically furniture intended for the use of children it is of vital importance to assure safe use of the furniture.

[0005] Use that potentially results in injury must be prevented otherwise if such use is possible it should be possible to perform in a safe manner.

[0006] This can be catered for by increasing the stability of the furniture. One example is to increase the extent of the footprint of the furniture module. Another example is to increase the weight of the furniture module.

[0007] Both solutions make the furniture module more difficult to use and handle.

[0008] Moreover, play furniture for children should ideally motivate the child to physical play and movement and on the other hand inspire to immersion into the creativity of the child but also enable more sedentary activities like relaxing, reading or unfolding of creativity.

Summary of Invention

[0009] An object of the present invention is to provide a furniture module that is safe to use.

[0010] According to the present invention, this is achieved by a furniture module for resting on a support surface in a first position of the furniture module, the module comprising:

- a first transverse panel,
- a counterbalance element,
- a pair of support structures spaced apart by the transverse panel,

wherein the support structures are configured for supporting the transverse panel in a position a distance D above the support surface,
wherein the furniture module has a centre of mass,
wherein the counterbalance element is configured for, when a predetermined weight is applied to the transverse panel and when the furniture module is pivoted a predetermined angle about a pivot line, maintaining the combined centre of masses of the furniture module and the predetermined weight, respectively, behind a vertical plane that contains the pivot line (you have a definition of behind in the description), such that the furniture module, with the predetermined weight applied and when pivoted a predetermined angle about the pivot line , will not overturn, wherein the contribution of the counterbalance element to maintaining the combined centre of masses on said side of the vertical plane is equal to or exceeds the contribution by the furniture module less the counterbalance element by a factor of 1.5 or by a factor of 2 or by a factor of 2.2 or by a factor of 3 or more.

[0011] It is herewith achieved that a safe furniture module is provided which is not overturned when a predetermined weight is placed on the first transverse and the furniture module is rotated a predetermined angle about a pivot line.

[0012] The first transverse panel, although it may be intended for use as a table top, also provides a platform that especially children would be likely to stand on without considering the risk of the furniture module overturning. In embodiment where the furniture module is used as a furniture for children or a play furniture, it is of vital importance that the furniture module is stable in this condition.

[0013] The first transverse panel is supported a distance D above the support surface by said pair of support structures. In the current embodiment the support structures are spaced apart a distance corresponding to the width of the first transverse panel. In another embodiment (not shown), the support structures could be placed inwardly from the side edges of the first transverse panel.

[0014] The contact area between the support structures and the support surface is defined as the footprint of the support structure. The footprint can be represented by a 2D outline on the support surface. The outline may be a single closed outline or an assembly of separate outlines.

[0015] The pivot line can be defined as in infinite line which is moved towards the outline or assembly of outlines in the 2d plane of the support surface until it intersects at least two points on the outline or assembly of outlines. As the

line is moved it does not cross the outline or assembly of outlines at any point before it intersects said at least two points.

[0016] There may be defined a plurality of pivot lines for a given outline.

[0017] For example a stool having four legs could have four pivot lines, i.e. one pivot line for each pair of legs.

[0018] Therefore the furniture module may have one or more counterbalance elements that contribute to the stability of the furniture module against overturning about one or more if not all of the pivot lines.

[0019] The counterbalance element can be tested by first rotating the furniture module the predetermined angle about the pivot line in question. The furniture module is supported in a way that it will not slide. A predetermined weight is applied to the transverse panel in a location which is most adverse in relation to the stability of the furniture module.

[0020] This configuration simulates a condition where the furniture module is in a potentially unstable condition with a child standing in a position where the furniture module is most likely to overturn.

[0021] If the furniture module does not overturn in this configuration it can be considered stable and safe.

[0022] This condition is met if the combined centre of masses of the furniture module, the counterbalance element and the weight in this configuration is located behind a vertical plane through the pivot line.

[0023] The term "behind" in this context means that the furniture module has not been rotated far enough for the combined centre of masses to having passed the vertical plane through the pivot line. Upon further rotation the combined centre of masses will pass through the vertical plane through the pivot line to a position in "front" of the vertical plane. At this angle the furniture module will overturn.

[0024] The contribution to the stability by the furniture module less the counterbalance element can be found by establishing the position of its centre of mass. The horizontal distance between the centre of mass and the vertical plane through the pivot line is established as A_{fm}. The force F_{fm} acting in the centre of mass due to the influence of gravity is established as the weight of the furniture module in kg less the counterbalance element multiplied with the gravitational constant 9.81 m/s^2.

[0025] The contribution of the furniture module less counterbalance element to the stability can be expressed as:

$$M_{fm} = A_{fm} \times F_{fm}$$

[0026] Likewise the contribution by the counterbalance element can be expressed as:

$$M_{cb} = A_{cb} \times F_{cb}$$

where A_{cb} is the horizontal arm between the centre of mass of the counterbalance element and the vertical plane through the pivot line and where F_{cb} is the force acting in the centre of mass of the counterbalance element due to the influence of gravity.

[0027] The contribution of the counterbalance element to maintaining the combined centre of masses behind the vertical plane exceeds the contribution by the furniture module less the counterbalance element when the following condition is met.

$$M_{cb} \geq M_{fm}$$

[0028] The contribution of the furniture module depends on the shape and composition of the furniture module.

[0029] The contribution of the counterbalance element depends on its position and weight.

[0030] There is a trade-off between the above parameters.

[0031] When the contribution to overall stability of the furniture module by the counter balance exceeds the contribution by the furniture module less counterbalance element by a factor of 1, 1.5, 2, 2.2, 3 or more a good trade-off is reached.

[0032] According to a further embodiment, the furniture module according to the invention is characteristic in that, the counterbalance element is a bar extending transversely between the support structures.

[0033] In the current specification the term "bar" should be understood as including a long slender object. The object having a cross section that fits within a circumscribed circle that has a diameter which is significantly smaller than the length of the bar. The bar may have a cross sectional shape that is selected among cylindrical, elliptical, triangular, square, pentagonal, hexagonal, heptagonal, octagonal, polygonal, prismatic, curved or a combination of the aforementioned shapes. The term "bar" within this application also includes rods. The bar can be solid or hollow.

[0034] It is herewith achieved that the counterbalance element can be integrated into the furniture module in a manner that is advantageous.

[0035] By attaching the counterbalance element to the support structures the counterbalance element may add to the structural stability of the furniture module. Thereby some material may be saved in the furniture module with the counterbalance element without compromising the structural stability. Thus, a lighter furniture module is provided. The factor of contribution to the stability against overturning by the counterbalance element is then automatically increased as the weight of the furniture module is decreased.

[0036] In an embodiment of the invention the longitudinal axis of the counterbalance element is parallel with the pivot line.

[0037] It is herewith achieved that the contribution of the counterbalance element to the stability against overturning for a given location is maximized.

[0038] In an embodiment the according to the invention, the furniture module is characteristic in that, weight per length of the bar is at least 5 kg/m, or 7.5 kg/m or 10 kg/m or 15 kg/m or 20 kg/m.

[0039] Moreover, the counterbalance element can be used as a handle.

[0040] According to a further embodiment, the furniture module according to the invention is characteristic in that, the counterbalance element comprises a permanent magnet or a magnetisable material.

[0041] The counterbalance element thus provides an additional function as attachment point for accessories having a magnetisable material or a permanent magnet.

[0042] In an example the counterbalance element is made of magnetisable steel. Steel is a strong material providing a counterbalance element which is relatively strong but having a relatively low volume due to the high density.

[0043] This is not achieved in the same way by for example selecting lead as the material for the counterbalance element. Lead has a much higher density than steel but its strength is much lower.

[0044] On the other hand selecting a fibre reinforced material such as carbon or glass-fibres provides a strong material but the density is extremely low. This would require a much higher volume of the counterbalance element to achieve the same contribution to the stability against overturning.

[0045] This can be solved by combining the two materials.

[0046] Thus, in an embodiment of the invention, the counterbalance element is a fibre reinforced bar having integrated lead or steel components.

[0047] According to a further embodiment, the furniture module according to the invention is characteristic in that, the counterbalance element is located at a vertical distance from the support surface between 0 mm and the vertical position of the transverse panel or between 25 mm to 100 mm above the support surface.

[0048] When the counter balance is located with a distance of 0 mm to the support surface the furniture module must be rotated almost 90 deg. before the mass centre of the counterbalance element passes through the vertical plane through the pivot line. Therefore this provides good stability.

[0049] A disadvantage of this location is that there is a risk of body parts, for example hands, fingers, feet and toes, getting caught under the counterbalance element. As the counter balance is a relatively heavy part of the furniture module there is a risk of injury should this happen.

[0050] The risk is reduced when the counter balance is located with a distance to the support surface. A distance between 25 mm to 100 mm will avoid injury in most cases.

[0051] According to a further embodiment, the furniture module according to the invention is characteristic in that, the predetermined weight is between 25 kg and 75 kg or between 45 kg and 55 kg or 50 kg.

[0052] The above weight ranges correspond to the weight of children at different ages with a safety factor included.

[0053] According to a further embodiment, the furniture module according to the invention is characteristic in that, the predetermined angle is between 5 deg and 45 deg or between 10 deg and 25 deg or 10 deg.

[0054] The above angle ranges correspond to the most often occurring orientations of the furniture module when it is operating outside its intended use angle which is 0 deg. rotation.

[0055] According to a further embodiment, the furniture module according to the invention is characteristic in that, the support structures comprises a pair of planar side panels, wherein each side panel has an outline comprising:

- a first support edge segment configured for supporting the furniture module on the support surface in the first position of the furniture module, and
- a connecting edge segment closing the outline.

[0056] The first support edge segment can be a straight line arranged in the same plane when the pair planar side panels are located in the furniture module.

[0057] The first support edge can also be at least 2 smaller straight line segments in plane mentioned above.

[0058] The connecting edge segment is shaped according to the functioning of the furniture module. The connecting segment defines the boundary of the side panels in the furniture module. The connecting segment inscribes the connection between the first transverse panel and side panel and also the connection between the counterbalance element and the side panel.

[0059] According to a further embodiment, the furniture module according to the invention is characteristic in that, the outline further comprises a second support edge segment separated from the first support edge segment by a point on the pivot line, said second support edge segment is configured for supporting the furniture module on the support surface in a second position of the furniture module.

[0060] It is herewith achieved that the furniture module is operable in a second position. The functionality of the furniture module is herewith increased.

[0061] The connecting segment connects the free end of the first support edge segment at one end and closes the outline by connecting to the free end of the second support edge segment at its other end.

[0062] The location of the counterbalance element may change in this position if it remains attached in the same location.

[0063] The transverse panel changes position and orientation. Therefore the height above the support surface may change and also the function, i.e. it may no longer function as a platform. Thus, the predetermined weight may not be applied at the same height. Furniture module is rotated approximately 30 deg. to 90 deg. the transverse panel is no longer considered a platform and is not suitable for supporting a weight because the weight will slide down from the transverse panel. Thus the risk of a child standing or sitting on the transverse panel which is changing into an edge when rotated 90 deg. is eliminated.

[0064] According to a further embodiment, the furniture module according to the invention is characteristic in that, the first transverse panel is a planar panel, wherein the first transverse panel is substantially parallel with the first support edge segment.

[0065] In this embodiment the transverse panel is suitable for use for example as a table top.

[0066] According to a further embodiment, the furniture module according to the invention is characteristic in that, the furniture module comprises a second transverse panel extending between said pair of support structures.

[0067] The second transverse panel adds to the structural stability of the furniture module. Moreover when the furniture is in its second position the second transverse panel may function as a seat and the first transverse panel as a seatback.

[0068] According to a further embodiment, the furniture module according to the invention is characteristic in that, the second transverse panel is located adjacent the second support edge portion.

[0069] The second transverse panel can be flush with the second transverse support edge or displaced slightly below the second support edge portion.

[0070] With the furniture module in its first position the second transverse panel is vertical and functions for example as a wall or seatback.

[0071] With the furniture module in its second position the second transverse panel is horizontal and functions for example as a seat or a floor.

[0072] Two furniture modules can be placed in a face-to-face relationship or back-to-back relationship. In this case the second transverse panel functions as a floor in a cave or an end wall.

[0073] According to a further embodiment, the furniture module according to the invention is characteristic in that, the first support edge segment is substantially perpendicular to the second support edge segment.

[0074] The furniture module is rotated 90 deg. between its two operable positions.

[0075] According to a further embodiment, the furniture module according to the invention is characteristic in that, the connecting edge segment is convex.

[0076] This is an added safety feature. The furniture module can be intended for use only in its first orientation and/or second orientation if applicable. The stability can be designed into those two positions.

[0077] If the furniture module is placed with the connecting edge segment on the support surface it will not be stable. Thus, a user will be discouraged from positioning the furniture on the connecting edge segment and naturally encouraged to use the furniture module as intended.

[0078] According to a further embodiment, the furniture module according to the invention is characteristic in that, the connecting edge segment comprises two line segments.

[0079] According to a further embodiment, the furniture module according to the invention is characteristic in that, the furniture module comprises a pair of wheels, wherein a wheel is attached to each support structure, wherein the rotation axes of the wheels are co-axial.

[0080] It is herewith achieved that the furniture module can be moved in an easy manner.

[0081] According to a further embodiment, the furniture module according to the invention is characteristic in that, the radius of the wheels is less than or equal to the shortest distance between the axis of rotation and the first or second support edge segment, wherein the side panels are chamfered at the intersection between the first and second support segment, such that the wheels contact the support surface when the furniture module is pivoted about the axis of rotation of the wheels.

[0082] It is herewith achieved that the wheels are inoperable when the furniture module is resting one the support surface.

[0083] This feature protects against unintentional sliding of the furniture module.

[0084] According to a further embodiment, the furniture module according to the invention is characteristic in that, the

distance D is equal to or less than 600 mm.

[0085] It is herewith achieved that the furniture module can be used on a hard surface and that no matt or soft support surface is required to protect against a fall. This is described in EN 71-8:2011 - Safety of toys. Activity toys.

[0086] According to a further embodiment, the furniture module according to the invention is characteristic in that, the width of the furniture module is less than or equal to 770mm.

[0087] It is herewith achieved that the furniture module can pass through a door opening.

[0088] According to a further embodiment, the furniture module according to the invention is characteristic in that, the furniture module comprises a first connecting means, wherein the first connecting means is configured for releasable attachment to a second connecting means on an accessory.

[0089] According to a further embodiment, the furniture module according to the invention is characteristic in that, the first connecting means comprises a permanent magnet or a magnetisable material.

[0090] It is herewith achieved that the accessory can be connected in a way that is especially safe. This is because there are no strings, ropes or bands that may cause suffocation by strangulation.

[0091] According to a further embodiment, the furniture module according to the invention is characteristic in that, the side panels and/or the first and/or second transverse panels comprises an aperture.

[0092] The aperture may have a size that allows a child to enter into the furniture module through the side panel.

[0093] The aperture shall have a size that prevents the child from becoming stuck in the aperture.

[0094] According to a further embodiment, the furniture module according to the invention is characteristic in that, the furniture module comprises a hanger, wherein the hanger comprises a cross bar and an abutment member both extending between the side panels, wherein the abutment member is spaced from the cross bar, wherein the cross bar is configured to receive a hook extending from the rear side of a storage box and wherein the abutment member is configured for abutment with the rear side of the storage box, such that the storage box can be hung from the furniture module in a predetermined orientation.

[0095] It is herewith achieved that the storage box may be hung from the hanger in one position only. The hanger may be configured for only allowing the storage box to be hung inside the furniture module, such that the storage box does not decrease the stability of the furniture module.

[0096] As mentioned previously, a related, but independent invention is provided in the form of a furniture kit comprising a furniture module and an accessory and a co-operating connecting means, wherein the connecting means are releasable, wherein one portion of the connecting means is located on the furniture module and wherein the other portion of the connecting means is located on the accessory.

[0097] It is herewith achieved that an accessory can be temporarily connected to the furniture module.

[0098] According to a further embodiment of the furniture kit, the furniture module according to the invention is characteristic in that, one portion of the connecting means comprises a permanent magnet and wherein the other portion comprises a magnetisable material.

[0099] It is herewith achieved that the accessory can be connected in a way that is especially safe. This is because there are no strings, ropes or bands that may cause suffocation by strangulation.

[0100] The furniture module may be combined in a furniture system comprising at least two elements selected among furniture modules, wall modules, storage boxes, stools, matt-like elements, plug elements, tunnel elements and curtain elements.

[0101] The furniture module is a building block in this system and provides for endless possibilities in combinations.

[0102] The two possible orientations of the furniture module also add to the possibilities.

[0103] It should be emphasized that the term "comprises/comprising/comprised of" when used in this specification is taken to specify the presence of stated features, integers, steps or components but does not preclude the presence or addition of one or more other features, integers, steps, components or groups thereof.

Brief description of the drawings

[0104] The invention will be explained in more detail below with reference to the accompanying drawing, where:

Fig. 1 fig. 2 shows a first embodiment of the furniture module in a first position, shows a first embodiment of the furniture module in a second position,

fig. 3-4 shows a second embodiment of the furniture module,

fig. 5-6 shows a detail view of the furniture module in the area of the intersection between the first and second support edge segments,

fig. 7-8 shows the first embodiment of the furniture module with accessories,

fig. 9 shows a section cut through the first embodiment of the furniture module with a storage box,

fig. 10 shows a second embodiment of the furniture module with accessories,

fig. 11 shows a section cut through the second embodiment of the furniture module with a storage box and a stool,

fig. 12 shows a wall module,
fig. 13 shows a wall module with a storage box and a stool,
fig. 14-15 shows a section cut through a wall module with a storage box being mounted,
fig. 16-17 shows a section cut through a wall module with a stool being removed,
fig. 18 shows a furniture system in a first embodiment,
fig. 19 shows a furniture system in a second embodiment,
fig. 20 shows a furniture system in a third embodiment, and
fig. 21 shows an example of the forces and location of mass centres of the various components making up the furniture module.

[0105] In the following, the invention will be described in greater detail with reference to embodiments shown by the enclosed figures. It should be emphasized that the embodiments shown are used for example purposes only and should not be used to limit the scope of the invention.

Description of the embodiments

[0106] In the explanation of the figures, identical or corresponding elements will be provided with the same designations in different figures. Therefore, no explanation of all details will be given in connection with each single figure/embodiment.
[0107] Fig. 1 shows a first embodiment of the furniture module 10' in a first position and fig. 2 shows the embodiment in fig. 1 in a second position.
[0108] The furniture module 10' is adapted for resting on a support surface 12, see fig. 21.
[0109] The furniture module comprises a first transverse panel 14 a counterbalance element 16 and a pair of support structures 18 - one on each side of the transverse panel 14.
[0110] The first transverse panel 14 is located a distance D above the support surface.
[0111] Moreover, the embodiment in fig. 1 and 2 comprises a second transverse panel 19. The second transverse panel 19 is located adjacent the second support edge segment 30
[0112] In the embodiment in fig. 1 and 2 the first transverse panel 14 and second transverse panel 19 are planer panels.
[0113] In the embodiment in fig. 1 and 2 the counterbalance element 16 is a bar extending transversely between the support structures.
[0114] The counterbalance element 16 is located at a vertical distance from the support surface 12, see fig. 21. It is herewith achieved that the risk of a person getting fingers jammed under the relatively heavy counterbalance element is prevented.
[0115] The counterbalance element 16 is made of a magnetisable material.
[0116] In the embodiment in fig. 1 and 2 the support structures 18 comprises a pair of planar side panels.
[0117] The side panels each have an outline 26 that comprises a first support edge segment 28, a second support edge segment 30, that is substantially perpendicular to the first support edge segment 28 and two connecting edge segments 32 closing the outline.
[0118] In the embodiment shown in fig. 1 and 2 the two connecting edge segments are convex. This provides a safety feature in that a user is less inclined to place the furniture module 10' such that it rests on the connecting edge segments instead of the support edge segments because the user will find that the furniture module 10' is unstable as opposed to resting on a straight edge. This prevents misuse of the furniture module 10' by placing it in an unintended position.
[0119] The furniture module 10' is resting on the first support edge segments 28 of the pair of support structures 18 when the furniture module is in its first position. When turned about a pivot line 20, which in the present embodiment is coinciding with the rotation axis of a pair of wheels 34 that are connected to the support structure.
[0120] The furniture module 10' can be pivoted about the pivot line 20 to a second position, see fig. 2, where it rests on the second support edge segment 30.
[0121] In this position the function of the counterbalance element 16 as contributor to the stability of the furniture module 10' is not required as long as the counterbalance element 16 is unsuitable as a support for a weight.
[0122] The intersection between the first and second support edge segments 28, 30 are chamfered, see fig. 5, and the diameter of the wheels 34, see fig. 6, are selected such that the wheels are only operable when the furniture module 10' is pivoted a sufficient angle about the pivot line 20. Then the wheels 34 touch the support surface 12 and the furniture module 10' can be rolled on the wheels 34 to a new position.
[0123] The side panels each comprise an aperture 36. fig. 3-4 shows a second embodiment of the furniture module 10". Only the additional features of the second embodiment in relation to the first embodiment will be discussed.
[0124] In second embodiment the furniture module 10" is taller than the first embodiment.
[0125] The first transverse panel 14 is located about halfway up the second transverse panel 19.
[0126] The furniture module 10" comprises a hanger 40 that provides for storage of accessories, for example storage boxes 300, see fig. 10-11.

[0127] The embodiment shown comprises one hanger 40.

[0128] The hanger 40 comprises a cross bar 50 and an abutment member 60 both extending between the side panels of the support structures 18.

[0129] The abutment member 60 is vertically spaced from the cross bar 50 towards a lower position. The cross bar 50 is configured to receive a hook extending from the rear side of a storage box 300 (see fig. 10 and 11). The abutment member 60 is configured for abutment with the rear side 320 of the storage box 300, such that the storage box 300 can be hung from the furniture module 10" in a predetermined orientation.

[0130] In an embodiment the cross bar 50 comprises a permanent magnet (not shown) or a magnetisable material.

[0131] In an embodiment the abutment member 60 comprises a permanent magnet (not shown) or a magnetisable material.

[0132] In either embodiments described above it is achieved that an accessory comprising a magnetisable material or a permanent magnet, respectively may be realisably attached to the furniture module 10".

[0133] In relation to furniture for children the above embodiments provides a safety advantage over attachment by strings, rope, velcro-type fasteners or other types of releasable fasteners that needs to be tied around another element to hold.

[0134] The first and second transverse panels 14, 19 both comprise an aperture 42, 44. The apertures 42, 44 are aligned such that for example an electrical cord may enter through the apertures 42, 44.

[0135] The second embodiment is not intended for use in a second position as the first embodiment.

[0136] However, it is possible to pivot the second embodiment about the wheels rotation axis to a second orientation.

[0137] Fig. 5-6 shows a detail view of the furniture module 10 in the area of the wheels 34.

[0138] The furniture module 10 is resting on the first support edge segment 28. The wheel radius is arranged such that it is equal to the vertical distance between the wheels rotation axis and the first support edge segment 28. Moreover, the intersection between the first support edge segment 28 and the second support edge segment 30 or the connecting edge segment 32 for the first or second embodiment respectively is chamfered.

[0139] In the present context the term "vertical" relates to the orientation of the furniture module 10 in fig. 5 and 6.

[0140] The wheels 34 will touch the support surface only after the furniture module 10 has been rotated a certain angle. Thus the furniture module 10 is resting securely on the support surface in its first orientation and its second orientation if applicable. Unintentional rolling on the wheels 34 is prevented.

[0141] Fig. 7-8 shows the first embodiment of the furniture module 10' with accessories.

[0142] In fig. 7 the furniture module 10' is in its first orientation, where it is resting on the first support edge segment 28.

[0143] The first transverse panel 14 can be used as a table. A stool 400 is arranged in front of the first transverse panel 14 such that a person can sit comfortably at the table.

[0144] The stool 400 is of a type having two pairs of legs 410. The legs have a cutout such that the may straddle over the counterbalance element 16.

[0145] In fig. 8 the furniture module 10' is in its second orientation, where it is resting on the second support edge segment 30.

[0146] The first transverse panel 14 can be used as a backrest and the second transverse panel 19 as a seat.

[0147] A storage box 300 is hung from the first transverse panel 14 on the outside of the furniture module 10'.

[0148] The storage box 300 has two hooks 310 that are configured for catching the first transverse panel 14 by having a hook opening that corresponds to the thickness of the first transverse panel 14. When the storage box 300 is released the rear side 320 of the storage box 300 abuts against the first transverse panel 14 under the influence of gravity and maintains a predetermined orientation. This is shown in more detail in fig. 9.

[0149] Fig. 9 shows a section cut through the first embodiment of the furniture module 10' with a storage box 300. The storage box 300 is hung inside of the furniture module 10'.

[0150] fig. 10 shows a second embodiment of the furniture module 10" with accessories.

[0151] The first transverse panel 14 can be used as a table. A stool 400 is arranged in front of the first transverse panel 14 such that a person can sit comfortably at the table.

[0152] The stool 400 is of a type having two pairs of legs 410. The legs have a cutout such that the may straddle over the counterbalance element 16, see also fig. 11.

[0153] A storage box 300 is hung from the first transverse panel 14 on the outside of the furniture module 10'.

[0154] The storage box 300 has two hooks 310 that are configured for catching the cross bar 50. When the storage box 300 is released the rear side 310 of the storage box 300 abuts against the abutment member 60 under the influence of gravity and maintains a predetermined orientation. This is shown in more detail in fig. 11.

[0155] Fig. 11 shows a section cut through the second embodiment of the furniture module 10" with a storage box 300 and a stool 400.

[0156] Fig. 12 shows a wall module 200.

[0157] The wall module 200 comprises a rear panel 210 and a pair of side panels 220. The side panels 220 are mounted at either end of the rear panel 210.

[0158] The rear panel 210 and the side panels 220 are generally planar panels.

[0159] The wall module 200 configured for installation on a wall with the rear panel 210 and the side panels 220 in a vertical orientation. The wall module 200 is attached to the wall using a plurality of fastening means 230.

[0160] In the embodiment shown the fastening means 230 comprise four bolts, but any number and type of fastening means 230 can be used as long as the wall module 200 is securely fixed to the wall.

[0161] The wall module 200 comprises a hanger 240 that provides for on-wall storage of accessories, for example storage boxes 300 and/or the stool 400 (see fig. 13-17.

[0162] The embodiment shown comprises two hangers 240.

[0163] The hanger 240 comprises a cross bar 250 and an abutment member 260 both extending between the side panels 220.

[0164] The abutment member 260 is vertically spaced from the cross bar 250 towards a lower position. The cross bar 250 is configured to receive a hook extending from the rear side of a storage box 300 (see fig. 14 and 15). The abutment member 260 is configured for abutment with the rear side of the storage box 300, such that the storage box 300 can be hung from the wall module 200 in a predetermined orientation.

[0165] In an embodiment the cross bar 250 comprises a permanent magnet (not shown) or a magnetisable material.

[0166] In an embodiment the abutment member 260 comprises a permanent magnet (not shown) or a magnetisable material.

[0167] In either embodiments described above it is achieved that an accessory comprising a magnetisable material or a permanent magnet, respectively may be realisably attached to the wall module 200.

[0168] In relation to furniture for children the above embodiments provides a safety advantage over attachment by strings, rope, velcro-type fasteners or other types of releasable fasteners that needs to be tied around another element to hold.

[0169] Fig. 13 shows a wall module 200 with a storage box 300 and a stool 400.

[0170] The storage box 300 has two hooks 310 that are configured for catching the cross bar 250. When the storage box 300 is released the rear side of the storage box 300 abuts against the abutment member 260 under the influence of gravity and maintains a predetermined orientation. This is shown in more detail in fig. 14-15.

[0171] The stool 400 is of a type having two pairs of legs 410 of which only three are visible in fig. 13. At least two of the legs 410 are equipped with a catch member 420, see fig. 16-17. The catch member 420 is configured for catching the cross bar 250 when the stool 400 is hung on the wall module 200. The distance between the pair of legs 410 is determined such the lower most pair of legs 410 will abut against the rear panel 210 of the wall module 200 under the influence of gravity. This is shown in more detail in fig. 16-17.

[0172] Fig. 14-15 shows a section cut through a wall module 200 with a storage box 300 being mounted.

[0173] In fig. 14 the storage box 300 is aligned such that the cross bar 250 will move into engagement with the hooks 310 when the storage box 300 is moved downwards in the vertical direction.

[0174] In fig. 15 the hooks 310 have engaged with the cross bar 250 and the storage box is resting with its hooks 310 on the cross bar 250. The rear side 420 is in abutment with the abutment member 260.

[0175] Due to its weight the storage box 300 apply forces to the wall module 200 under the influence of gravity. The hooks 320 apply a force having both a vertical and a horizontal component to the cross bar 250. The rear side 320 apply a force to the abutment member 260 that acts perpendicularly to the surface of the abutment member 260, which in this case is a horizontal force.

[0176] With this arrangement it is achieved that the storage box 300 maintains a desired position when hung onto the wall module 200.

[0177] Removal of the storage box 300 requires the above steps to be performed in the opposite order.

[0178] Fig. 16-17 shows a section cut through a wall module 200 with a stool 400 being removed.

[0179] In fig. 16 the stool 400 is suspended from the wall module 200. The catch members 420 of the uppermost pair of legs 410 is in engagement with the cross bar 250 and the lowermost pair of legs 410 is in abutment with the rear panel 210 of the wall module 200.

[0180] Due to its weight the stool 400 applies forces to the wall module 200 under the influence of gravity. The uppermost catch members 420 apply a force having both a vertical and a horizontal component to the cross bar 250. The lowermost pair of legs 410 applies a force to the rear panel 210 that acts perpendicularly to the surface of the rear panel 210, which in this case is a horizontal force.

[0181] With this arrangement it is achieved that the stool 400 maintains a desired position when hung onto the wall module 200.

[0182] In fig. 17 the stool 400 has been moved vertically upwards. The uppermost catch member 420 is no longer in engagement with the cross bar 250.

[0183] In the embodiment shown the catch member 420 of the lowermost pair of legs 410 has engaged the lowermost cross bar 250.

[0184] The stool 400 can be rotated until the uppermost pair of legs 410 is completely free of the cross bar 250. The

stool 400 can be lowered vertically to disengage the lowermost catch member 420 from the lowermost cross bar 250. Then the stool 400 can be completely removed from the wall module 200.

[0185] Installation of the stool 400 onto the wall module 200 is performed by applying the above steps in opposite order.

[0186] An advantage of the embodiment described above is that the stool can be placed on the wall module 200 in a 90 deg. orientation and a 180 deg. orientation in the same manner. This is because of the distance between the two pair of legs 410 and the distance between the cross bars 250. This is also why the lowermost catch member 420 engages the lowermost cross bar 250 during removal/installation.

[0187] Fig. 18 shows a furniture system 100 in a first embodiment. The furniture system 100 comprises a furniture module 10 in a first embodiment, which is a low furniture module 10', a furniture module 10 in a second embodiment, which is a tall furniture module 10", two wall modules 200, a plurality of accessories. For example storage boxes 300, a stool 400 and two matt-like elements 500.

[0188] The low furniture module 10' is shown in a second position. In this position the low furniture module 10' may be used as a hideout or a chair. A storage box is hung on the low furniture module 10', see also fig. 8.

[0189] The low furniture module 10' is positioned in front of two wall modules 200. The wall modules 200 are attached to a wall in a stacked configuration. A plurality of storage boxes 300 is hung from the wall modules 200.

[0190] A matt-like element 500 is temporarily attached to the low furniture module 10' and the wall module 200 as an arch or roof in the hideout. The temporary attachment is achieved by co-operating fastening means on the matt-like element 500 and the low furniture module 10' and the matt-like element 500 and the wall module 200, respectively.

[0191] Another matt-like element 500 is partly lying on the floor and partly lying on the low furniture module 10' as a carpet.

[0192] The tall furniture module 10" is positioned next to the low furniture module 10' and the wall modules 200.

[0193] The tall furniture module 10" comprises a storage box 300 that is hung from the tall furniture module 10". A stool 400 is positioned in front of the tall furniture module 10" in order to enable a person to sit in front of the tall furniture module 100.

[0194] The furniture system 100 may comprise any number of furniture modules 10 and accessories in any conceivable configuration to meet a certain demand.

[0195] Fig. 19 shows a furniture system 100 in a second embodiment.

[0196] The furniture system 100 comprises two furniture modules 10 in a first embodiment and two storage boxes 400.

[0197] Both furniture modules 10 are low furniture modules 10'.

[0198] The low furniture modules 10' are located in a face-to-face relationship. Where the first support edge segments 28 of the two furniture modules 10' is facing each other.

[0199] The furniture system 100 comprises plug element 600.

[0200] In the embodiment shown, each furniture module 10' comprises a plug element 600.

[0201] The plug element 600 is made of a resilient material. It is configured with a shape corresponding to, but slightly bigger than the aperture 36 in the furniture module 10'. A recess (not shown) is formed in the plug element 600, with a shape that fits the aperture 36. In this way the plug element 600 can be realisably installed in the aperture 36.

[0202] Fig. 20 shows a furniture system 100 in a third embodiment.

[0203] The furniture system 100 comprises two furniture modules 10 in a first embodiment, a plurality of matt-like elements 500, two tunnel elements 700 and a curtain element 800.

[0204] Both furniture modules 10 are low furniture modules 10'. The low furniture modules 10' are both placed in their first orientation.

[0205] The plurality of matt-like elements 500 are temporarily attached to the low furniture module 10'. The temporary attachment is achieved by co-operating fastening means on the matt-like element 500 and the counterbalance element 16.

[0206] In an embodiment the co-operating fastening means comprises a permanent magnet and a magnetisable material.

[0207] In an embodiment the matt-like element 500 comprises at least one permanent magnet.

[0208] The curtain element 800 is temporarily attached to the low furniture module 10'. The temporary attachment is achieved by co-operating fastening means on the furniture module 10' and the curtain element 800.

[0209] In an embodiment the curtain element 800 comprises at least one permanent magnet.

[0210] Fig. 21 is an example of the forces and location of mass centres of the various components making up the furniture module 10.

[0211] In fig. 21 the furniture module 10 is pivoted a predetermined angle θ in relation to a support surface 12. The furniture module 10 is pivoted about a pivot line 20. A vertical plane 22 that contains the pivot line 20 is defined above the support surface.

[0212] The furniture module 10 without the counterbalance element has a mass centre with a moment arm A_{fm} to the vertical plane 22 and a gravitational force F_{fm} acting vertically downwards through its mass centre.

[0213] The counterbalance element 16 has a mass centre with a moment arm A_{cb} to the vertical plane 22 and a gravitational force F_{cb} acting vertically downwards through its mass centre.

[0214] The furniture module 10 combined with the counterbalance element 16 has a combined total mass centre with a moment arm At to the vertical plane 22 and a gravitational force F_t acting vertically downwards through the total combined mass centre.

[0215] The furniture module 10 combined with the counterbalance element 16 has a combined total mass centre with a moment arm At to the vertical plane 22 and a gravitational force F_t acting vertically downwards through the total combined mass centre.

[0216] The predetermined weight 24 has a mass centre with a moment arm A_w to the vertical plane 22 and a gravitational force F_w acting vertically downwards through the its mass centre.

[0217] The combined mass centre is composed of the combined mass centres of the furniture module 10 including the counterbalance element 16 and the mass centre of the predetermined weight 24. The combined mass centre has an arm A_C to the vertical plane 22 and a gravitational force F_C composed of the combined weights of the furniture module 10 including the counterbalance element 16 and the predetermined weight 24.

[0218] The counterbalance element 16 is configured for maintaining the combined mass centre behind the vertical plane 22.

[0219] The term "behind" in this context means on the same side of the vertical plane 22 as the total mass centre of the furniture module 10 including the counterbalance element 16.

[0220] When the above condition is satisfied the furniture module is stable and will not overturn when subject to the predetermined weight and predetermined angle.

[0221] The contribution of the counterbalance element 16 to the stability can be expressed as:

$$M_{cb} = A_{cb} \times F_{cb}$$

[0222] The contribution of the furniture module 10 less counterbalance element 16 to the stability can be expressed as:

$$M_{fm} = A_{fm} \times F_{fm}$$

[0223] The contribution of the counterbalance element to the stability shall be equal to or exceed the contribution of the furniture module 10 less counterbalance element 16 to the stability, i.e:

$$M_{cb} \geq M_{fm}$$

[0224] Preferably the contribution of the counterbalance element exceeds by a factor of two, i.e.;

$$M_{cb} \geq 2 \times M_{fm}$$

[0225] The contribution of the furniture module 10 with counterbalance element can be expressed as:

$$M_t = M_{fm} + M_{cb} = A_t \times F_t$$

[0226] An example embodiment is shown in the table below:

The predetermined weight in the example below is 50 kg and the predetermined angle that the furniture module is pivoted is 10 degrees. The main dimensions of the furniture module are (width, length, height): 700 mm, 670 mm, 660 mm and the distance D from the support surface to the first transverse panel is 550 mm.

	Furniture module (fm)	Counterbalance element (cb)	Total (t)
A	92 mm	560 mm	217 mm
F	192 N	70 N	262 N

(continued)

	Furniture module (fm)	Counterbalance element (cb)	Total (t)
M	17,7 Nm	39,3 Nm	57 Nm

[0227] As can be seen in the table above the contribution of the counterbalance element exceeds the contribution of the furniture module less counterbalance element by a factor of:

$$\frac{M_{cb}}{M_{fm}} = \frac{39{,}3}{17{,}7} = 2{,}22$$

[0228] Thus, the condition

$$M_{cb} \geq M_{fm}$$

Is fulfilled.

[0229] A second exemplary embodiment having the main dimensions as the previous embodiment the have the following values:

	Furniture module (fm)	Counterbalance element (cb)	Total (t)
A	92 mm	560 mm	217 mm
F	307 N	50 N	357 N
M	28,2 Nm	28,2 Nm	56,4 Nm

[0230] As can be seen in the table above the contribution of the counterbalance element is equal to the contribution of the furniture module less counterbalance element. Thus the contribution factor is:

$$\frac{M_{cb}}{M_{fm}} = \frac{28{,}2}{28{,}2} = 1$$

[0231] Thus, the condition

$$M_{cb} \geq M_{fm}$$

is fulfilled.

[0232] A third exemplary embodiment having the main dimensions as the previous embodiment, but a different location of the counterbalance element has the following values:

	Furniture module (fm)	Counterbalance element (cb)	Total (t)
A	92 mm	443 mm	217 mm
F	192 N	89 N	281 N
M	17,6 Nm	39,4 Nm	57 Nm

[0233] As can be seen in the table above the contribution of the counterbalance element is equal to the contribution of the furniture module less counterbalance element. Thus the contribution factor is:

$$\frac{M_{cb}}{M_{fm}} = \frac{39{,}4}{17{,}6} = 2{,}22$$

[0234] Thus, the condition

$$M_{cb} \geq M_{fm}$$

is fulfilled.

[0235] The location of the mass centres and the weight can be either measured directly using established methods or calculated using computer-aided-design software.

[0236] It is to be noted that the figures and the above description have shown the example embodiments in a simple and schematic manner.

Claims

1. Furniture module for resting on a support surface in a first position of the furniture module, the module comprising:

- a first transverse panel,
- a counterbalance element,
- a pair of support structures spaced apart by the transverse panel,

wherein the support structures are configured for supporting the transverse panel in a position a distance D above the support surface,
wherein the furniture module has a centre of mass,
wherein the counterbalance element is configured for, when a predetermined weight is applied to the transverse panel and when the furniture module is pivoted a predetermined angle about a pivot line, maintaining the combined centre of masses of the furniture module and the predetermined weight, respectively, behind a vertical plane that contains the pivot line (you have a definition of behind in the description), such that the furniture module, with the predetermined weight applied and when pivoted a predetermined angle about the pivot line , will not overturn, wherein the contribution of the counterbalance element to maintaining the combined centre of masses on said side of the vertical plane is equal to or exceeds the contribution by the furniture module less the counterbalance element by a factor of 1.5 or by a factor of 2 or by a factor of 2.2 or by a factor of 3 or more.

2. Furniture module according to claim 1, wherein the counterbalance element is a bar extending transversely between the support structures.

3. Furniture module according to claim 1 or 2, wherein the counterbalance element comprises a permanent magnet or a magnetisable material.

4. Furniture module according to any one of the previous claims, wherein the counterbalance element is located at a vertical distance from the support surface between 0 mm and the vertical position of the transverse panel or between 25 mm to 100 mm above the support surface.

5. Furniture module according to any one of the previous claims, wherein the predetermined weight is between 25 kg and 75 kg or between 45 kg and 55 kg or 50 kg.

6. Furniture module according to any one of the previous claims, wherein the predetermined angle is between 5 deg and 45 deg or between 10 deg and 25 deg or 10 deg.

7. Furniture module according to any one of the previous claims, wherein the pair of support structures comprises a pair of planar side panels, wherein each side panel has an outline comprising:

- a first support edge segment configured for supporting the furniture module on the support surface in the first position of the furniture module, and

- a connecting edge segment closing the outline.

8. Furniture module according to claim 7, wherein the outline further comprises a second support edge segment separated from the first support edge segment by a point on the pivot line, said second support edge segment is configured for supporting the furniture module on the support surface in a second position of the furniture module.

9. Furniture module according to claim 7 or 8, wherein the first transverse panel is a planar panel, wherein the first transverse panel is substantially parallel with the first support edge segment.

10. Furniture module according to any of the previous claims, wherein the furniture module comprises a second transverse panel extending between said pair of support structures.

11. Furniture module according to claim 8 or claim 8 combined with any one of claims 9 to 10, wherein the second transverse panel is located adjacent the second support edge portion.

12. Furniture module according to any one of claims 8 to 11, wherein the first support edge segment is substantially perpendicular to the second support edge segment.

13. Furniture module according to any one of claims 7 to 12, wherein the connecting edge segment is convex.

14. Furniture module according to any one of claims 7 to 12, wherein the connecting edge segment comprises two line segments.

15. Furniture module according to any one of the previous claims, wherein the furniture module comprises a pair of wheels, wherein a wheel is attached to each support structure, wherein the rotation axes of the wheels are co-axial.

16. Furniture module according to claim 15 combined with any one of claims 8 to 14, wherein the radius of the wheels is less than or equal to the shortest distance between the axis of rotation and the first or second support edge segment, wherein the side panels are chamfered at the intersection between the first and second support segment, such that the wheels contact the support surface when the furniture module is pivoted about the axis of rotation of the wheels.

17. Furniture module according to any one of the previous claims, wherein the distance D is equal to or less than 600 mm.

18. Furniture module according to any one of the previous claims, wherein the width of the furniture module is less than or equal to 770mm.

19. Furniture module according to any one of the previous claims, wherein the furniture module comprises a first connecting means, wherein the first connecting means is configured for releasable attachment to a second connecting means on an accessory.

20. Furniture module according to claim 19, wherein the first connecting means comprises a permanent magnet or a magnetisable material.

21. Furniture module according to any one of the previous claims, wherein the side panels and/or the first and/or second transverse panels comprises an aperture.

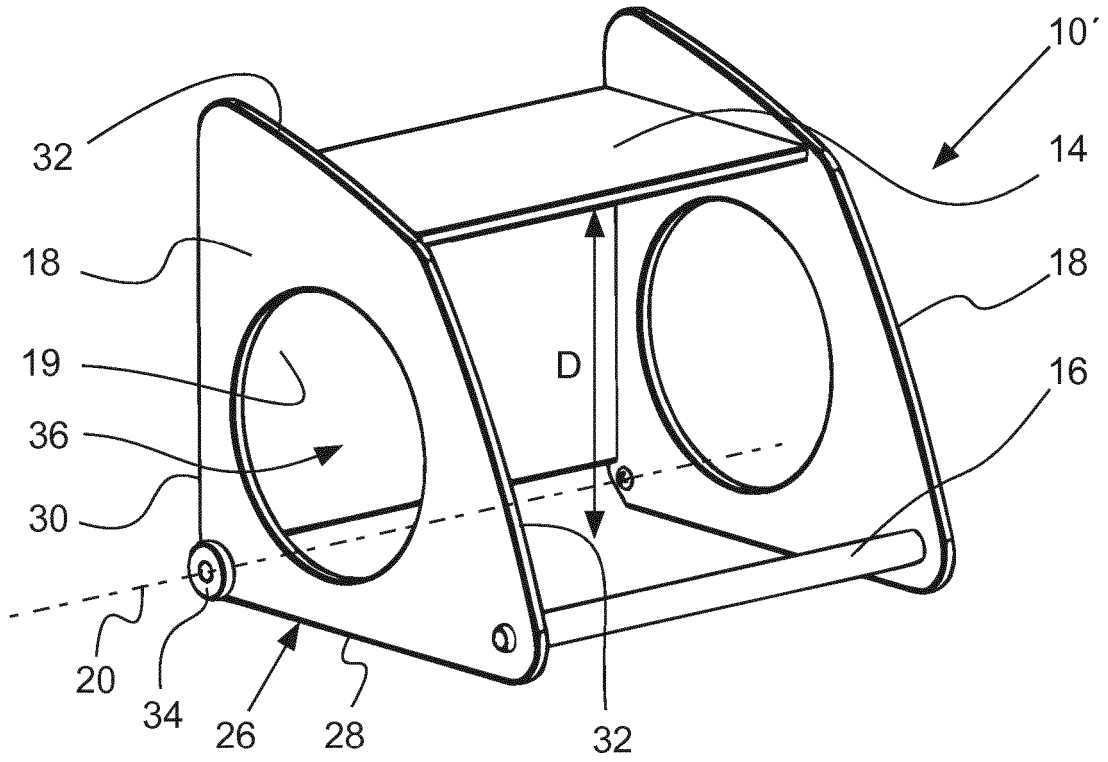
22. Furniture module according to any of the previous claims, wherein the furniture module comprises a hanger, wherein the hanger comprises a cross bar and an abutment member both extending between the side panels, wherein the abutment member is spaced from the cross bar, wherein the cross bar is configured to receive a hook extending from the rear side of a storage box and wherein the abutment member is configured for abutment with the rear side of the storage box, such that the storage box can be hung from the furniture module in a predetermined orientation.

23. Furniture kit comprising a furniture module and an accessory and a co-operating connecting means, wherein the connecting means are releasable, wherein one portion of the connecting means is located on the furniture module and wherein the other portion of the connecting means is located on the accessory.

24. Furniture kit according to claim 23, wherein one portion of the connecting means comprises a permanent magnet

and wherein the other portion comprises a magnetisable material.

25. Furniture system comprising at least two elements selected among furniture modules according to any of the claims 1 to 22, wall modules, storage boxes, stools, matt-like elements, plug elements, tunnel elements and curtain elements.


10´
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32

Fig. 1

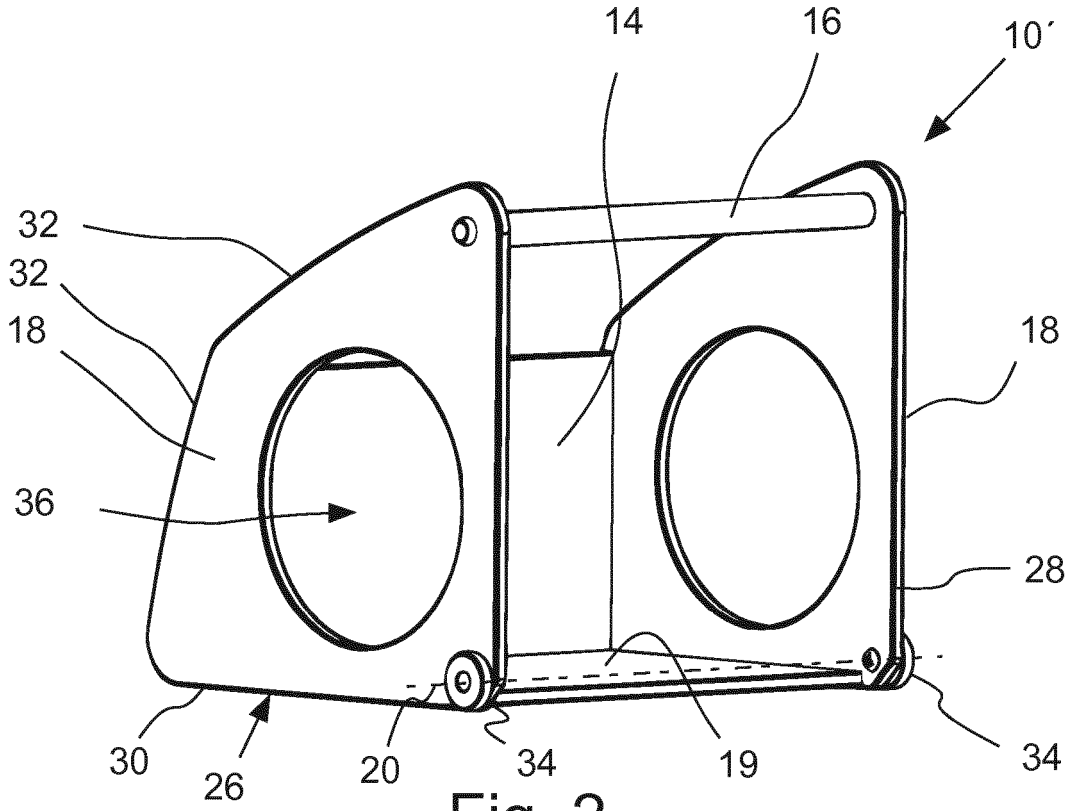
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Fig. 2

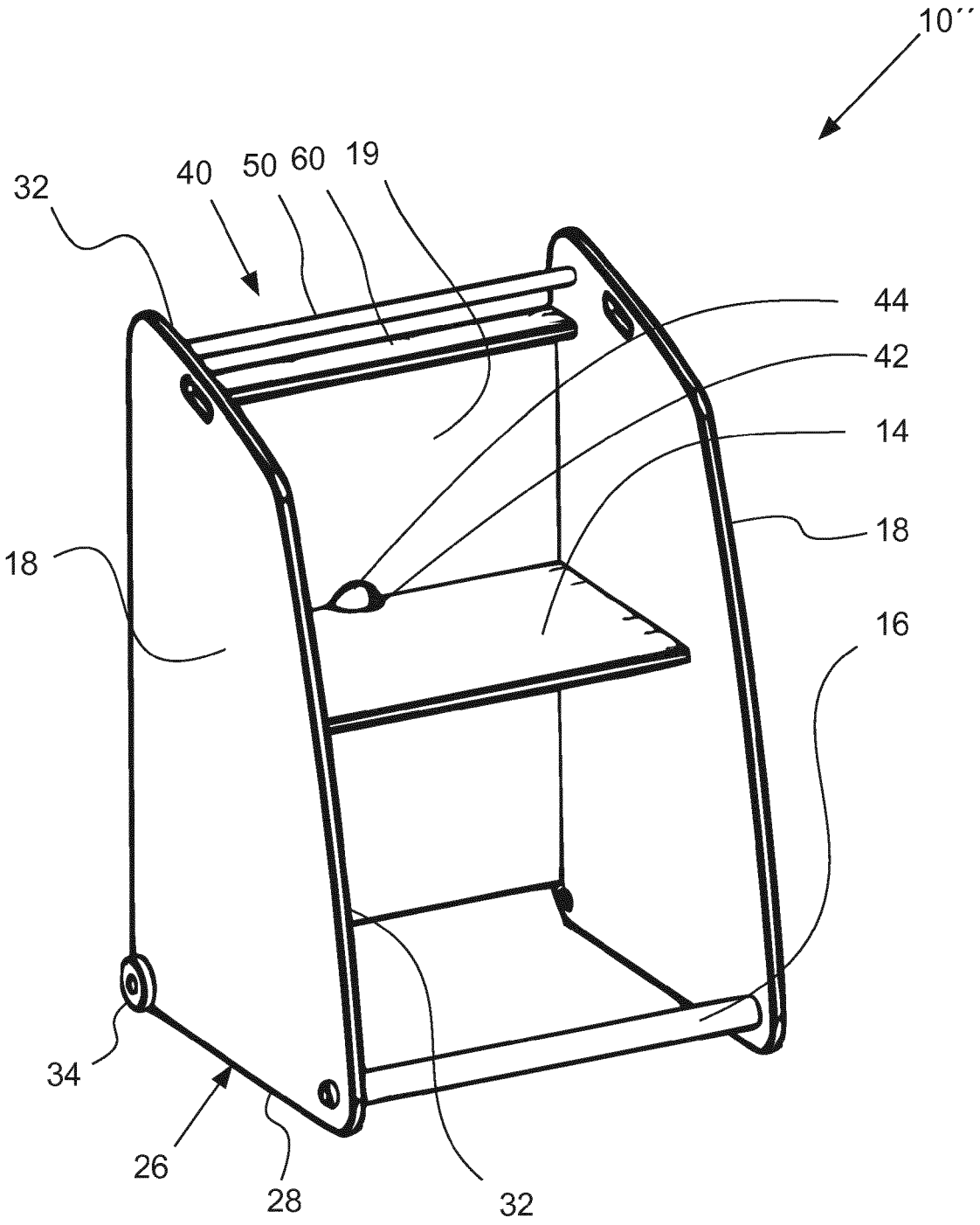


Fig. 3

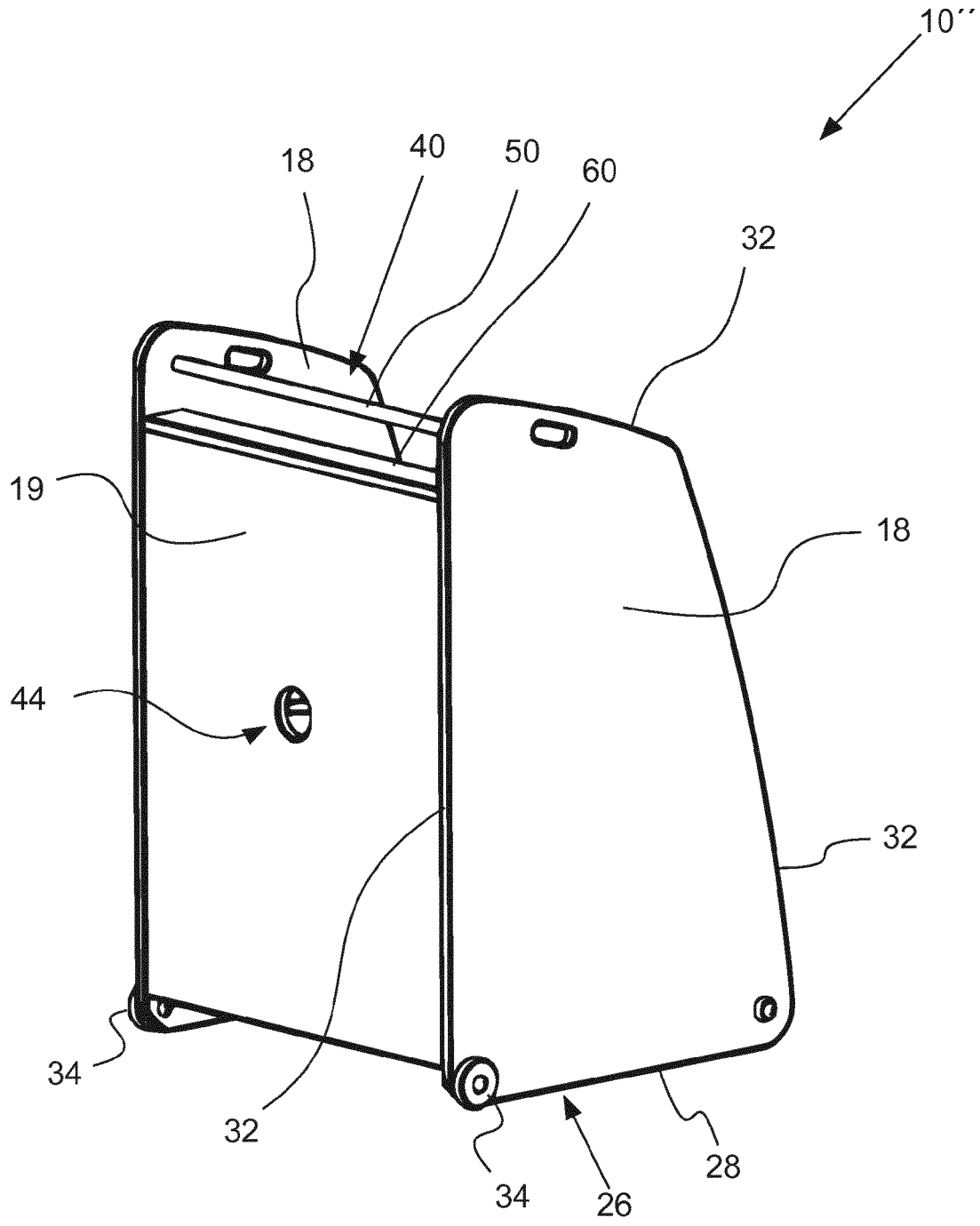


Fig. 4

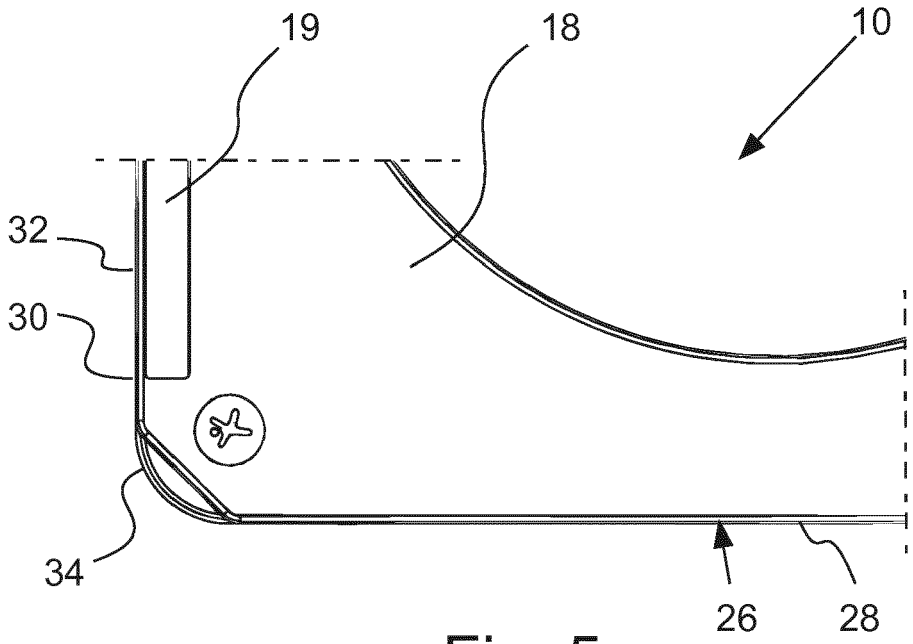


Fig. 5

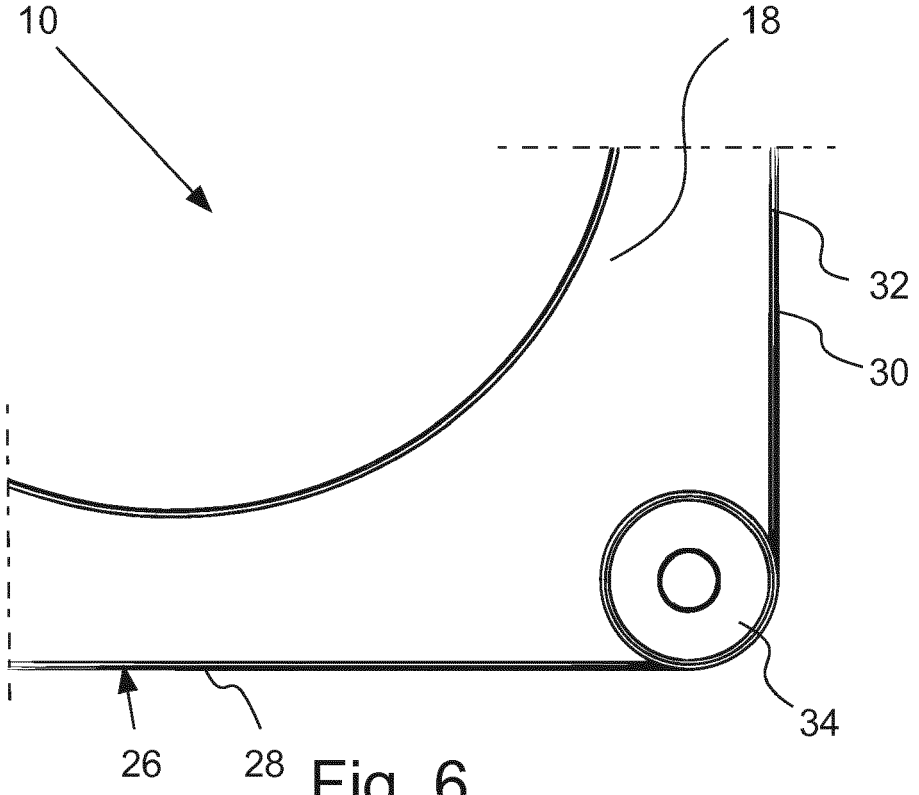


Fig. 6

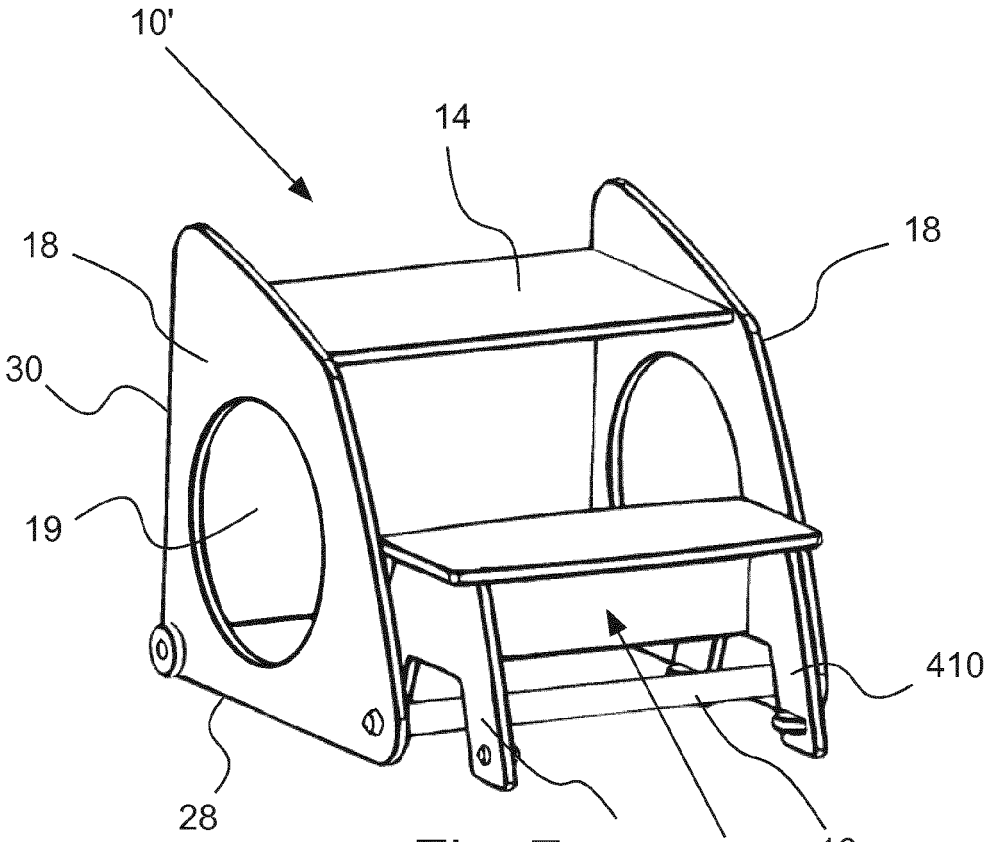

10'
14
18
18
30
19
410
28
410
400
16

Fig. 7

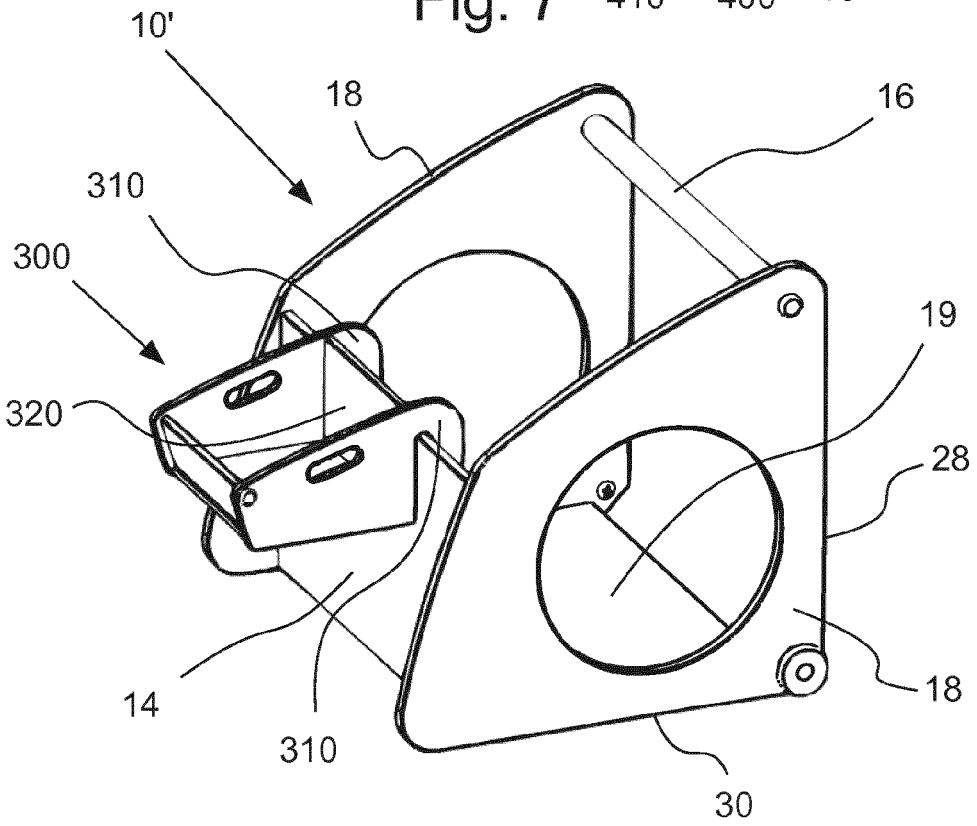

10'
18
16
310
300
19
320
28
14
310
18
30

Fig. 8

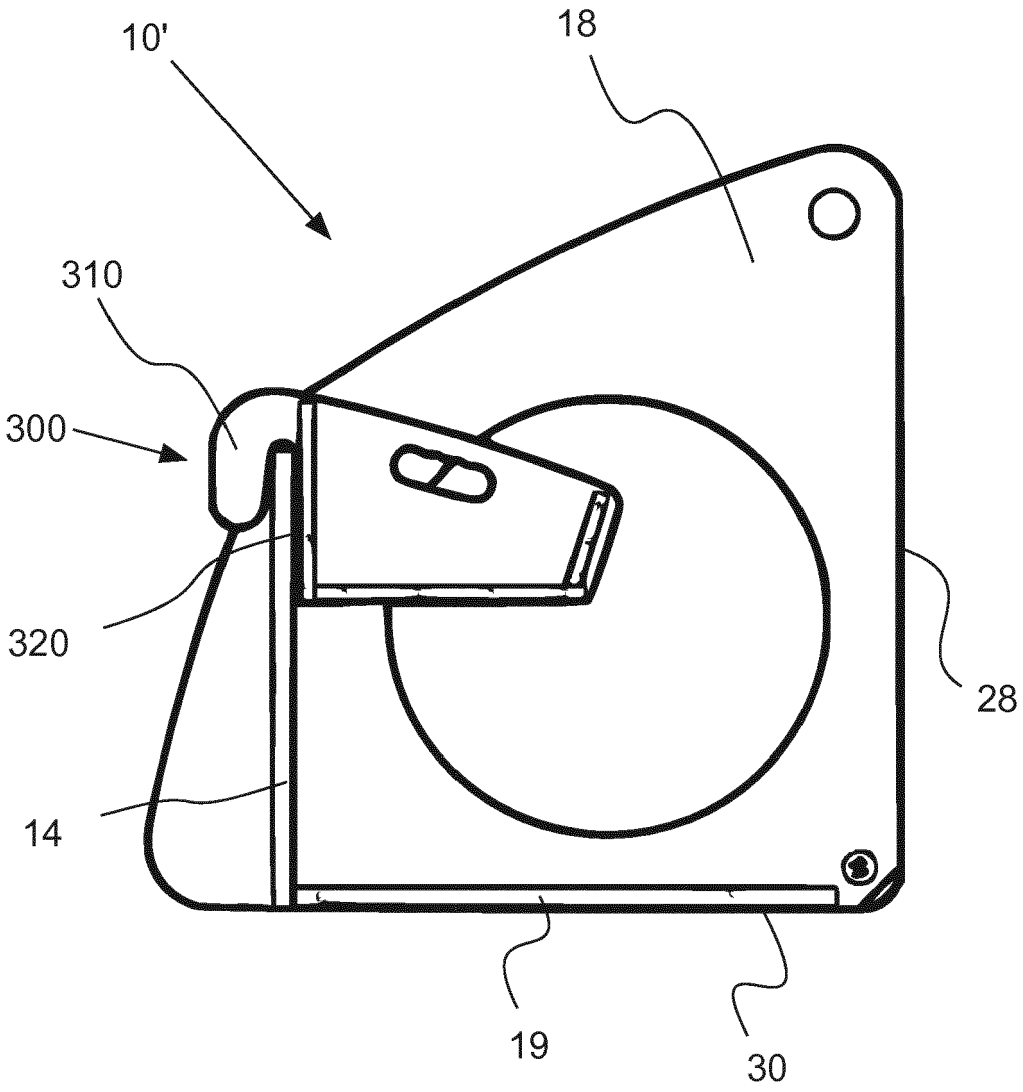


Fig. 9

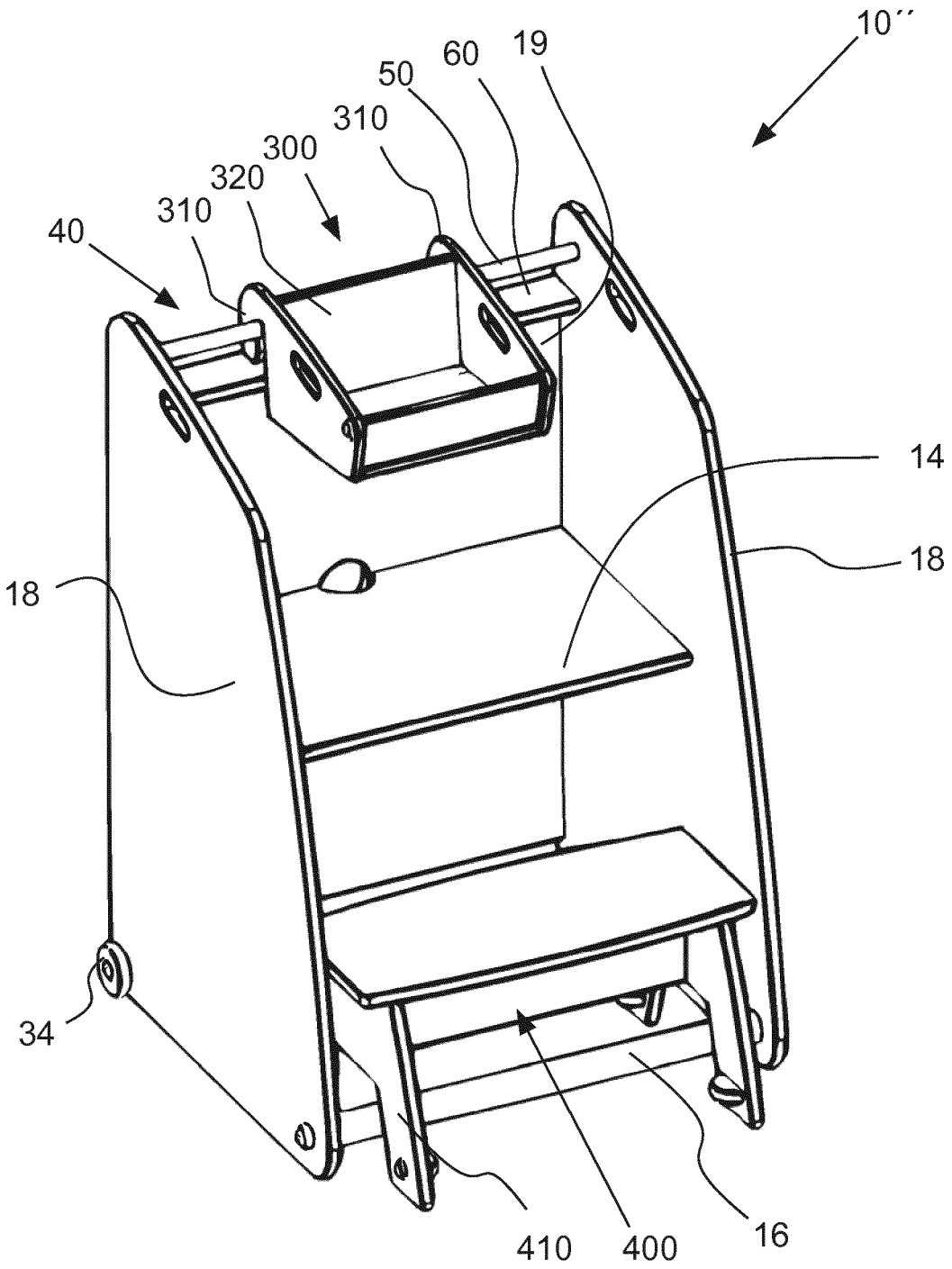


Fig. 10

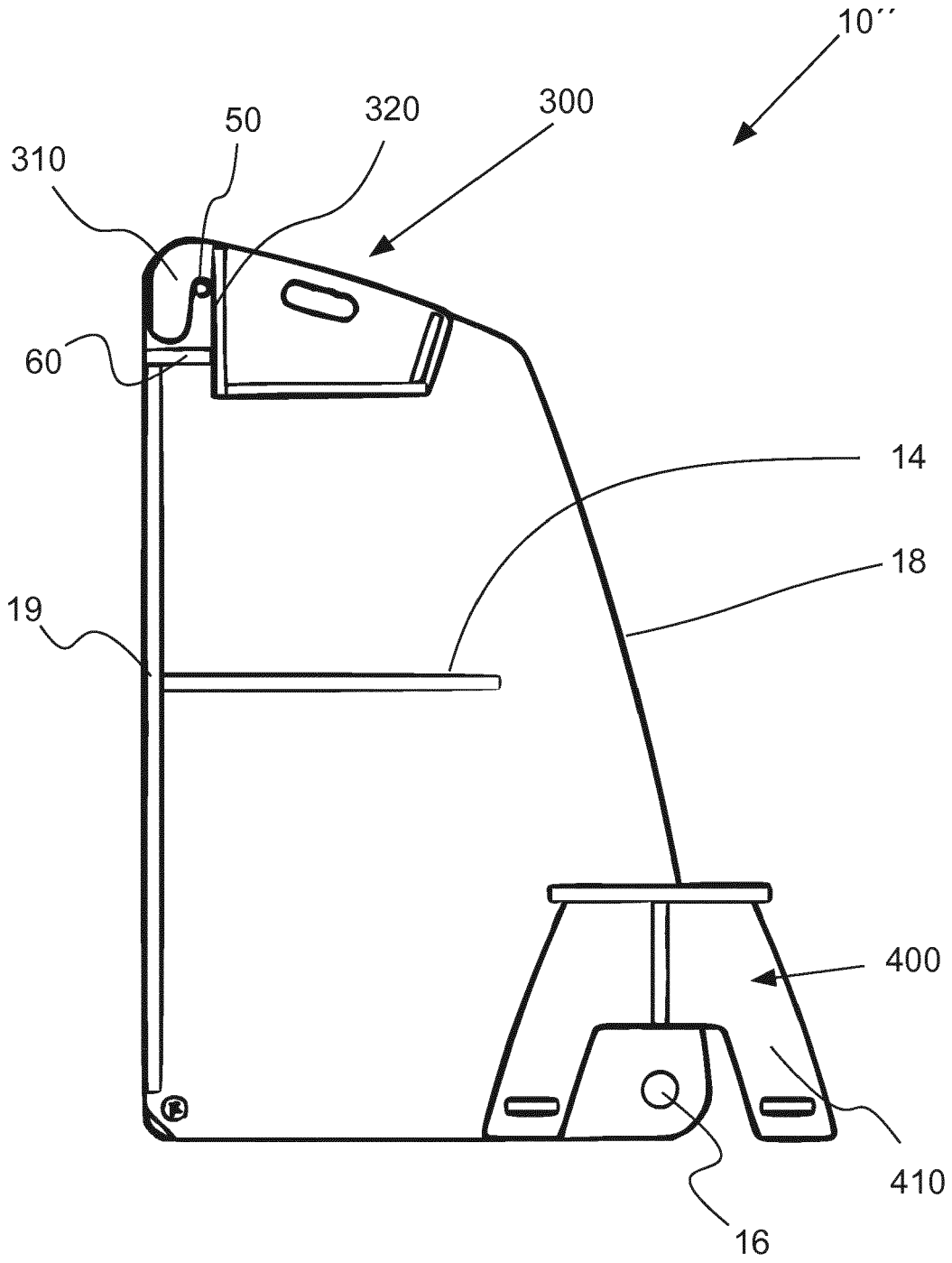


Fig. 11

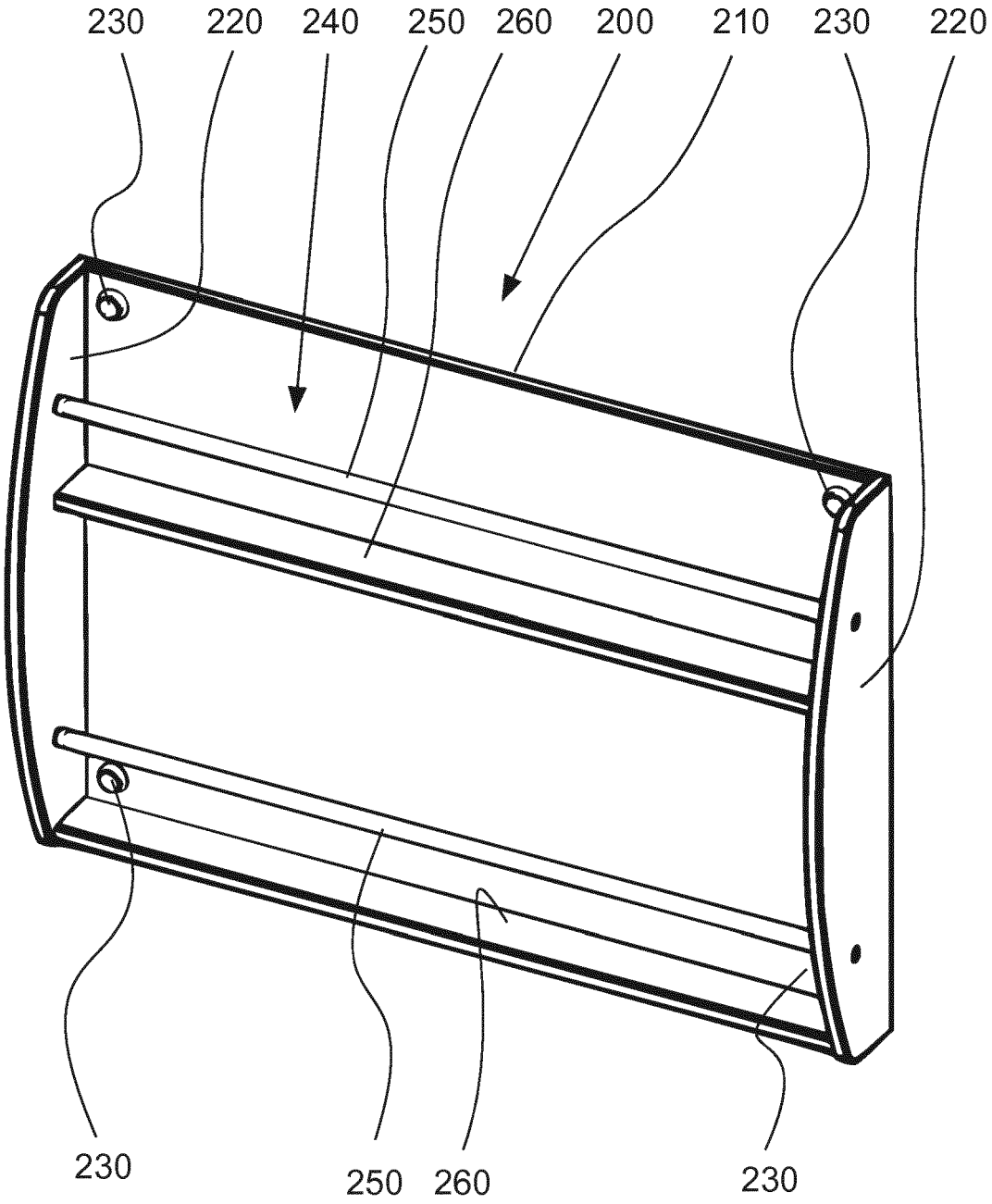


Fig. 12

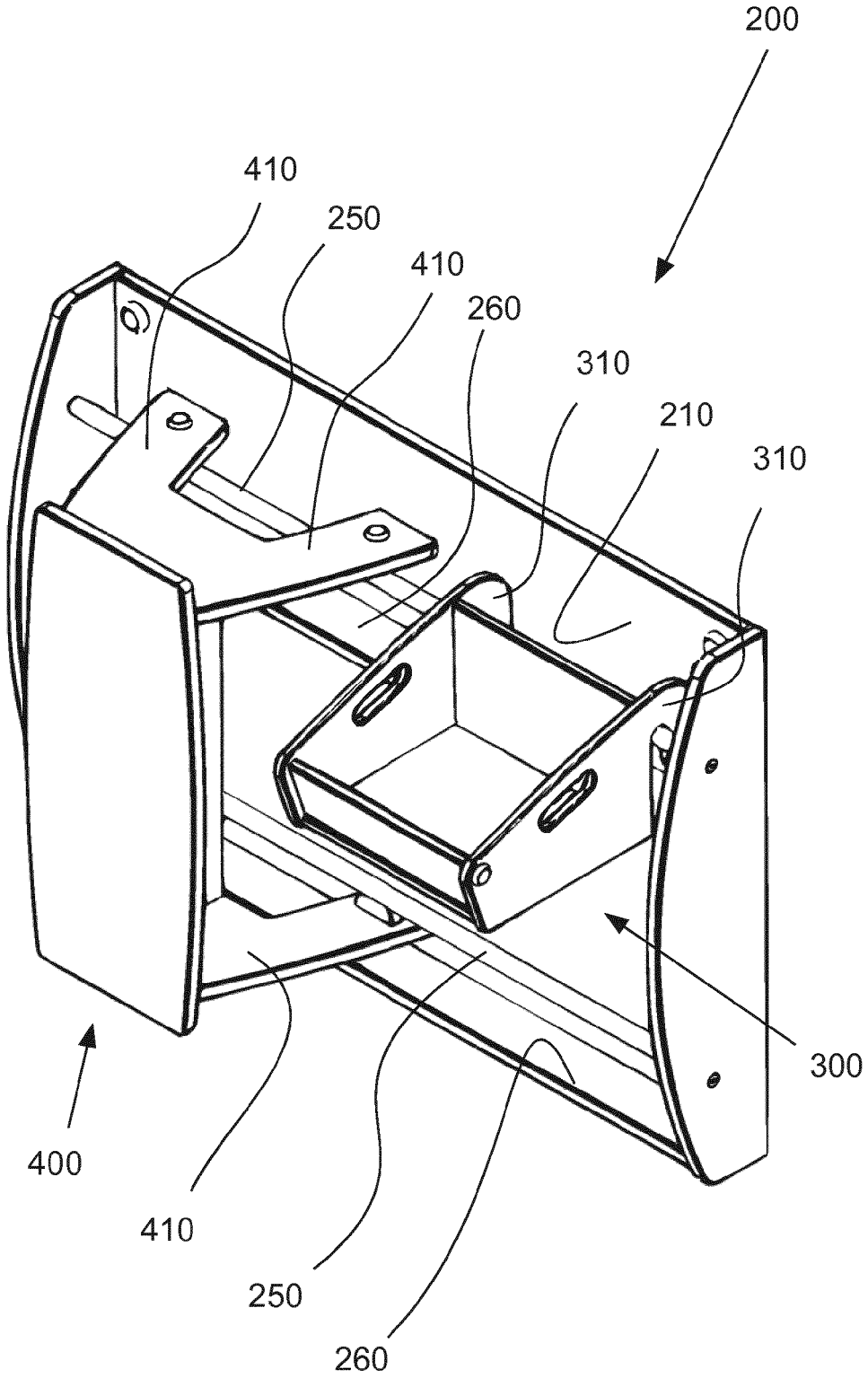
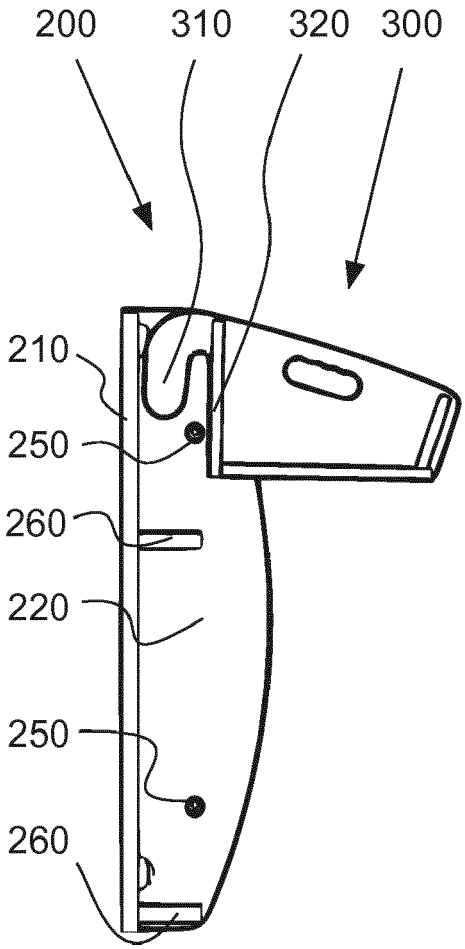


Fig. 13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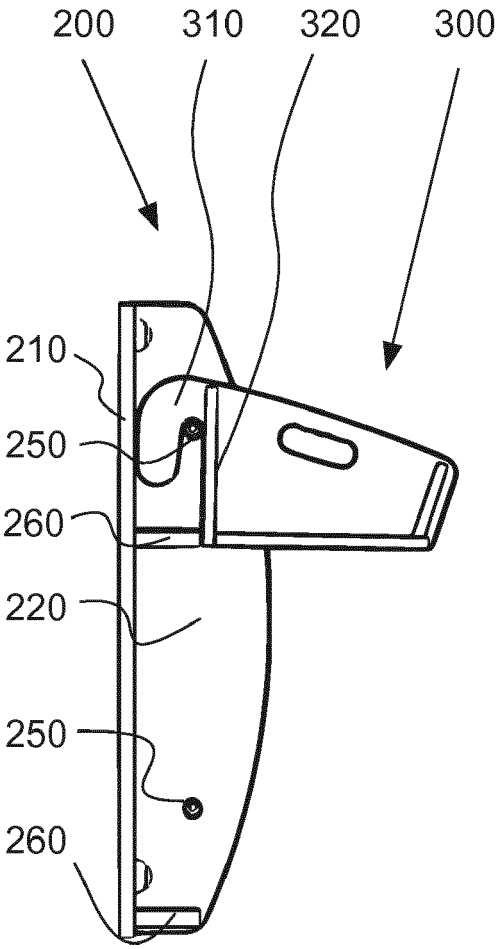
260
220
250
260

Fig. 14


200
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250
260
220
250
260

Fig. 15

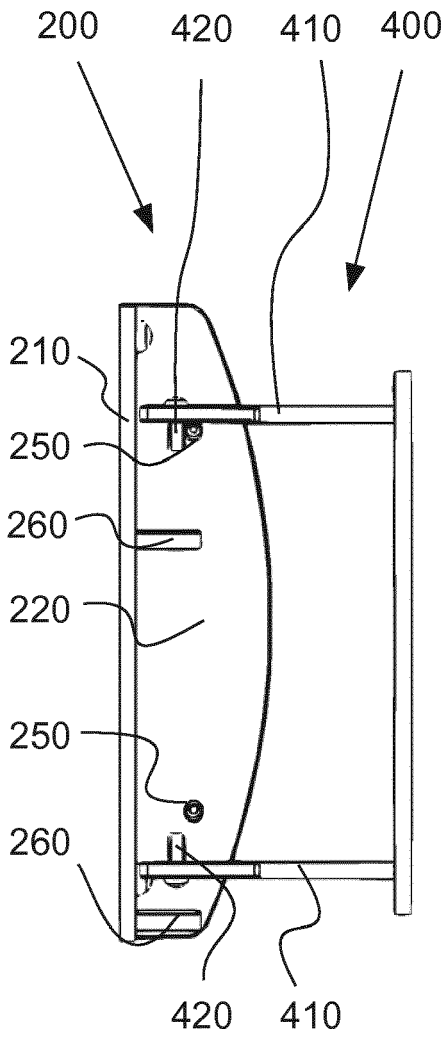
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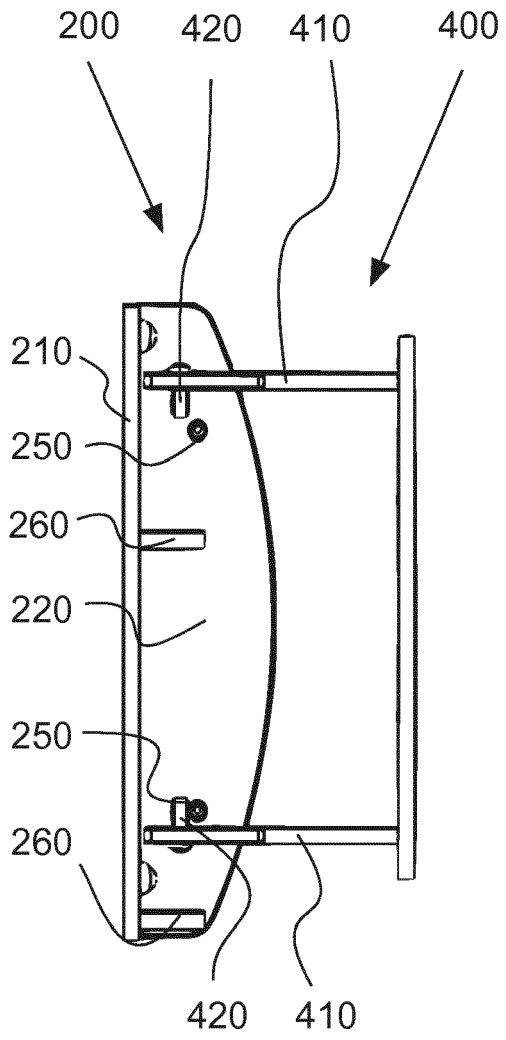
Fig. 16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420
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Fig. 17

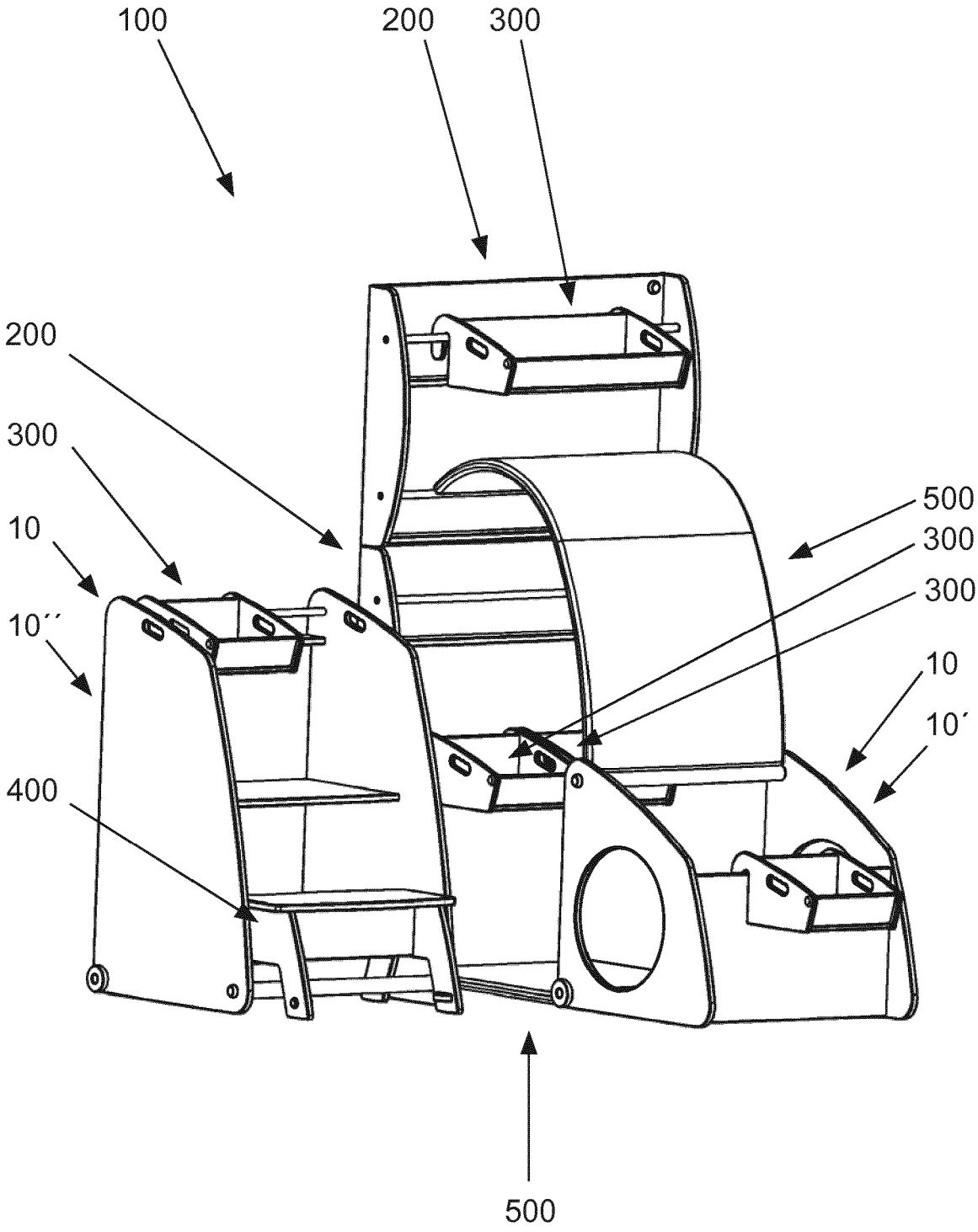

Fig. 18

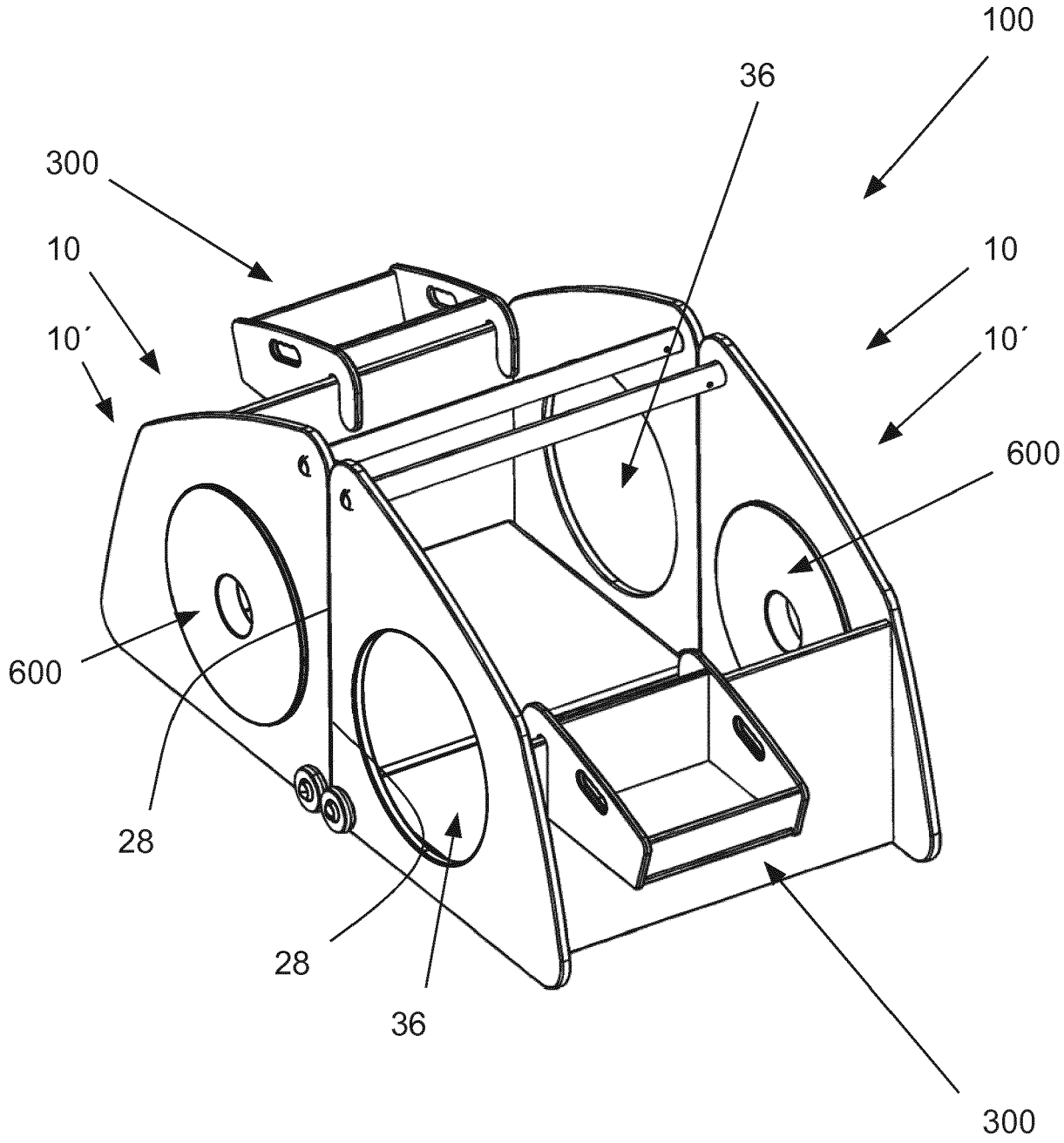

Fig. 19

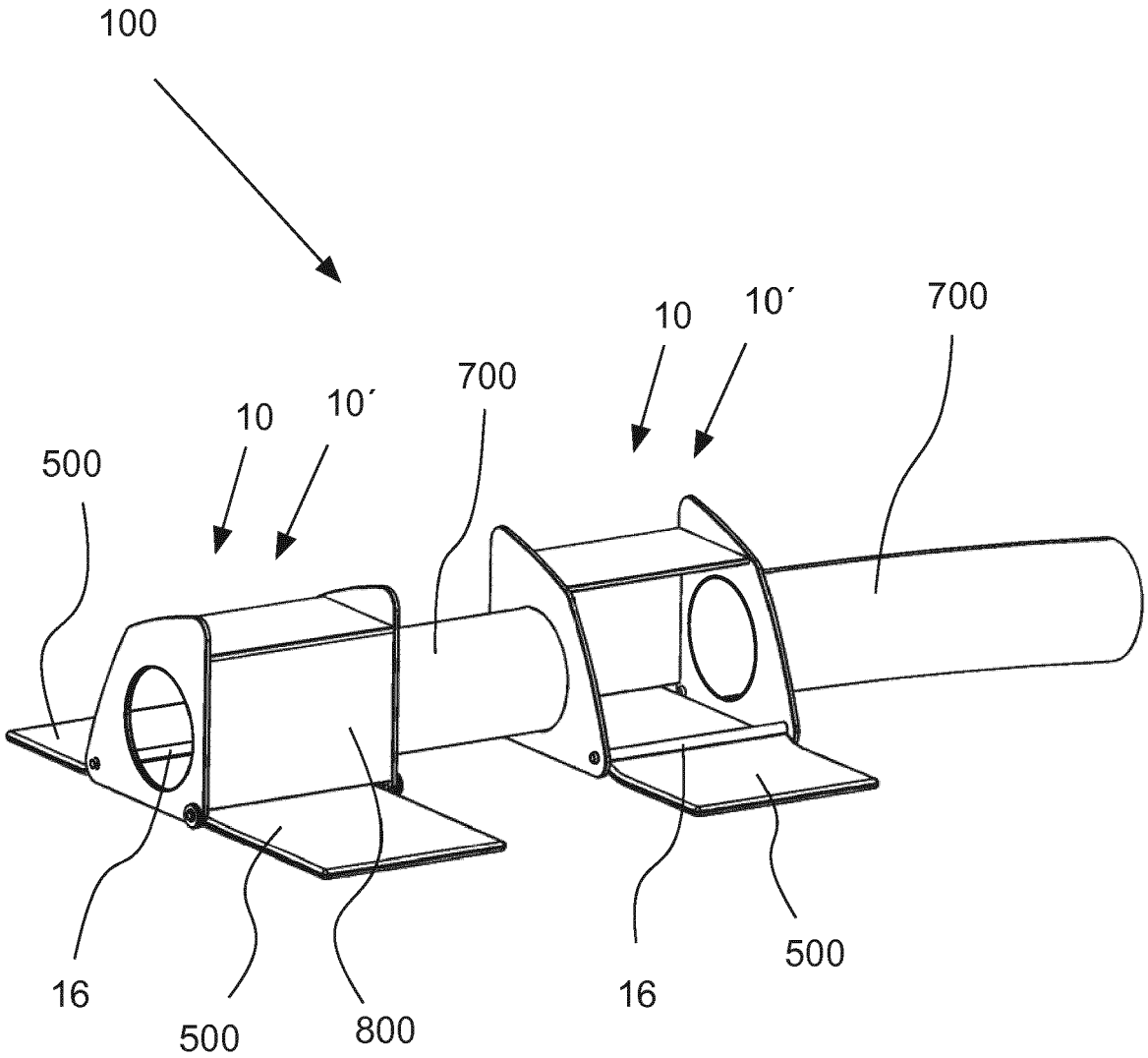

Fig. 20

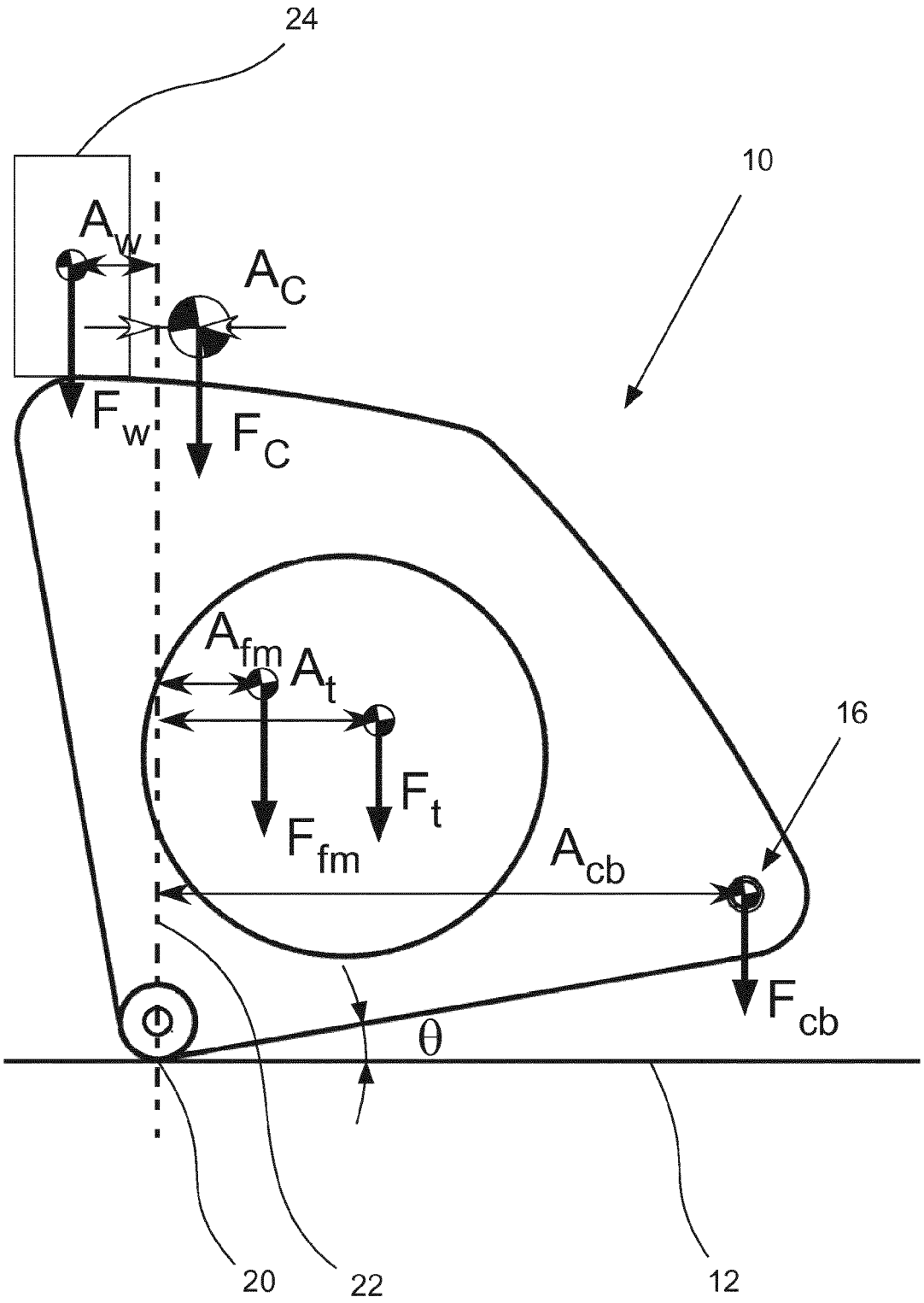

Fig. 21

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EUROPEAN SEARCH REPORT

Application Number
EP 15 17 6621

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TECHNICAL FIELDS SEARCHED (IPC)

A47B
A47C
A47D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	4 May 2016	Pössinger, Tobias

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04-05-2016

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