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(54) **RIGID CONTAINER WITH COLLAPSIBLE WALLS**

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US-B1- 6 293 418**

EP 3 590 858 B1

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Description

[0001] The present invention relates to a rigid container with collapsible walls and particularly a container of the type known as "crate" or "box" for the transport and storage of various types of products.

[0002] The container according to the invention is useful and practical, particularly but not exclusively, in the fields of logistics, transport and distribution of products, trade and agriculture.

[0003] Rigid containers are known and widespread which are normally shaped like a parallelepiped with the upper face open, are also known as "crates", and are used commonly for transporting and storing the most disparate types of products, both food products and other types of product.

[0004] Normally, these rigid containers are made of plastic or wood and are provided with at least two handles that make their manual transport convenient.

[0005] Besides being lightweight and having very low production costs, these rigid containers have the advantage that they can be stacked without compromising the contents.

[0006] In contrast with these advantages, said rigid containers have the drawback of having a considerable volume even when they are empty. This makes it impractical and very onerous to transport and store them.

[0007] In order to overcome this limitation, rigid containers provided with collapsible walls have been developed in which the side walls are pivoted to the base so that they can be folded onto it.

[0008] In practice, these rigid containers with collapsible walls of the known type can be configured in an open condition, in which they have the hollow parallelepiped shape typical of ordinary crates, and in a closed condition, in which the side walls are collapsed in a horizontal position on the base and the container assumes a flattened shape. In this manner the volume in the closed condition is very limited, to the benefit of practicality and transport and storage costs.

[0009] In order to be fixed in the open condition, rigid containers with collapsible walls of the known type are generally provided with locking systems that comprise hooks and/or mechanical interlocking profiles along the lateral edges of the side walls.

[0010] Such rigid containers with collapsible walls of the known type, despite being very useful and practical, are not free from drawbacks.

[0011] In particular, fixing in the open condition is particularly awkward, time consuming and laborious, requiring the manual locking of all the hooks present on the four corners, or in any case a force to be applied precisely on all four side walls to complete the mechanical interlocks. The same is true, conversely, for the transition from the open condition to the closed condition.

[0012] Further rigid containers with collapsible walls are known from the documents CN 1 730 353, US 6 293 418 and US 6 290 081.

[0013] Furthermore, according to the background art, simplification of the engagement and disengagement mechanisms (for example by reducing the number of mechanical elements that perform this task or providing only profiles with direct interlocking without safety locks) leads to lower reliability thereof and vice versa.

[0014] The aim of the present invention is to overcome the above mentioned drawbacks of the background art, devising a rigid container with collapsible walls that allows to pass from the closed condition to the open condition, and vice versa, in a quicker, more convenient and easier manner than the background art.

[0015] Within this aim, an object of the present invention is to provide a rigid container with collapsible walls that allows to provide a fixing in the open condition that is more reliable than the background art.

[0016] Another object of the invention is to provide a rigid container with collapsible walls that provides, with respect to the background art, an ergonomic improvement of the manual opening and closing operations.

[0017] A further object of the invention is to provide a rigid container with collapsible walls that can be opened and closed by means of automated systems.

[0018] A further object of the invention is to provide a rigid container with collapsible walls that is easy to provide and economically competitive if compared with the background art.

[0019] This aim and these and other objects which will become better apparent hereinafter are achieved by a rigid container with collapsible walls, which can be configured in an open condition, in which it is substantially shaped like a hollow parallelepiped, and in a closed condition, in which it has a flattened shape, comprising:

- a substantially quadrangular base and
- a first side wall which lies opposite to a second side wall and is adjacent to a third side wall and to a fourth side wall;

each one of said four side walls being pivoted with a lower edge to one of the four sides of the base, so that it can be rotated at least between a closed position, in which it is folded onto said base, and an open position, in which it is substantially perpendicular to said base;

said side walls comprising reversible fixing elements for the mutual mechanical coupling of each side wall with the side walls that are adjacent thereto, in order to fix the side walls in the open position; in said open condition all four side walls being fixed in said open position, said reversible fixing elements comprising retention means, which are arranged on the first side wall and on the second side wall, which, in the open condition, interact mechanically with adjacent abutment elements which are arranged on the third side wall and on the fourth side wall so as to contrast the rotation of at least said third side wall and said fourth side wall toward said closed position, and further comprising at least two release elements of which one is coupled to said third side wall,

on an external face thereof, and one is coupled to said fourth side wall, on an external face thereof, and each release element comprising:

- a central portion, which is adapted to be pushed manually and connected by means of two opposite connecting portions to two opposite pusher ends, each adapted to interact mechanically with one of said retention means;

each one of said release elements being configured so that by pushing said central portion a force is transmitted to said pusher portions, by means of said connecting portions, and consequently said pusher portions interact mechanically with said retention means, moving and/or deforming them so as to allow the rotation toward said closed position of the side wall to which said release element is coupled, characterised in that said connecting portions (62) are provided with one or more first protrusions (66), each of which can slide within an oblique slot (72) that is provided on the side wall (2c, 2d) to which the release element (60) is coupled.

[0020] Further characteristics and advantages will become better apparent from the description of a preferred but not exclusive embodiment of a rigid container with collapsible walls, illustrated by way of non-limiting example with the aid of the accompanying drawings, wherein:

Figure 1 is a side view of a possible embodiment of a rigid container with collapsible walls, according to the invention;

Figure 2 is a front view of the container of Figure 1; Figure 3 is the same front view of Figure 2 with the release element pushed upward;

Figure 4 is a top plan view of the container of Figure 1, in which the left part is shown in cross-section along a horizontal plane;

Figure 5 is an enlarged-scale view of a detail of the cross-section of Figure 4;

Figure 6 is a view of the same detail of Figure 5 in a condition in which the release element is pushed upwards;

Figure 7 is a perspective view of an external detail of the container of Figure 1;

Figure 8 is a perspective view of an internal detail of the container of Figure 1;

Figures 9, 10, 11 and 12 are views of a release element, according to the invention, respectively in a front view, from the rear side, in a top upper view, in a side view, in a front view from the front side and in a side view.

[0021] With reference to the above cited figures, the rigid container with collapsible walls, generally designated by the reference numeral 10, comprises a substantially quadrangular base 30 to which four side walls 2a, 2b, 2c, 2d are coupled.

[0022] The rigid container 10 can be configured in an

open condition (shown in particular in Figures 1, 2, 3, and 4) in which it is substantially shaped like a hollow parallelepiped, and in a closed condition, in which it has a flattened shape (i.e., with the four walls 2a, 2b, 2c, 2d resting horizontally on the base 30). The closed condition is per se known and not shown.

[0023] In greater detail, the container 10 comprises a first side wall 2a, a second side wall 2b, a third side wall 2c and a fourth side wall 2d, each of which is pivoted with a lower edge to one of the four sides of the base 30. More precisely, each one of the four side walls 2a, 2b, 2c, 2d is pivoted, in a known manner, to the base 30 so that it can be rotated at least between a closed position, in which it is folded (i.e., collapsed, laid horizontally) onto the base 30, and an open position, in which it is substantially perpendicular to said base 30 (in practice arranged like the lateral face of a parallelepiped having the base 30 as its base).

[0024] In the example shown, the base 30 has a rectangular shape, but can be equivalently also square.

[0025] To make the description clearer, it is useful to specify that hereinafter the term "opposite" will be used to indicate two side walls that in the open condition are parallel to each other and not in direct contact; while the term "adjacent" is understood to refer to the side walls that are not mutually opposite, i.e., that in the open condition are perpendicular to each other and in direct contact along a vertical edge. In view of this clarification, in the present description and in the accompanying claims, the expressions "first side wall 2a" and "second side wall 2b" identify two mutually opposite side walls and consequently the expressions "third side wall 2c" and "fourth side wall 2d" identify the remaining two side walls, which also are mutually opposite. Therefore, in other words, the first side wall 2a is the side wall that is opposite to the second side wall 2b and adjacent both to the third side wall 2c and to the fourth side wall 2d.

[0026] In the example shown, the first side wall 2a and the second side wall 2b are the longest walls, while the third side wall 2c and the fourth side wall 2d are the shortest walls. Obviously, embodiments are possible in which the first side wall 2a and the second side wall 2b are the shortest walls, while the third side wall 2c and the fourth side wall 2d are the longest walls.

[0027] In any case, in all the embodiments, in the open condition all four side walls 2a, 2b, 2c, 2d are fixed in the open position by means of removable fixing elements which are comprised in the side walls 2a, 2b, 2c, 2d and will be described in greater detail hereinafter.

[0028] In greater detail, the side walls 2a, 2b, 2c, 2d comprise reversible fixing elements for the mutual mechanical coupling of each side wall 2a, 2b, 2c, 2d to the side walls 2a, 2b, 2c, 2d that are adjacent thereto, in order to fix the side walls 2a, 2b, 2c, 2d in the open position.

[0029] The expression "removable fixing elements" is understood to mean, fully generally, any mechanical coupling-uncoupling system that allows to fix in a temporary and non-final manner the side walls 2a, 2b, 2c, 2d in the

open position. Optionally, the fixing elements can comprise, in addition to what will be described hereinafter, even known fixing systems used in containers with collapsible walls of the known type.

[0030] According to the invention, the reversible fixing elements comprise retention means 40, which are arranged on the first side wall 2a and on the second side wall 2b, which, in the open condition, interact mechanically with adjacent abutment elements 50 which are arranged on the third side wall 2c and on the fourth side wall 2d so as to contrast the rotation of at least said third side wall 2c and said fourth side wall 2d toward the closed position.

[0031] The retention means 40 are, in other words, elements, such as for example flexible protrusions of the first and second side walls 2a, 2b or buttons, or teeth, or shoulders that are retractable or tilting, which by resting each one against a respective abutment element 50 create a blockage that prevents, or at least contrasts, the rotation toward the closed position of the side wall 2c, 2d with which the abutment element 50 is integral.

[0032] The abutment elements 50 are in turn any element, such as a wall, a column, a simple surface portion of the third and fourth side walls 2c, 2d that is integral with said side wall 2c, 2d or part thereof, adapted to make contact with the respective retention means 40; in the preferred and illustrated embodiment, the abutment elements 50 are constituted by posts provided with a flat face directed toward the respective retention means 40 and arranged proximate to the lateral edges of the respective side walls 2c, 2d (two on the third side wall 2c and two on the fourth side wall 2d).

[0033] As is evident from Figures 4, 5, and 6, the retention means 40 are arranged at the internal faces (i.e., the faces directed toward the inside of the container 10) of the first side wall 2a and of the second side wall 2b.

[0034] Preferably, the retention means 40 are arranged proximate to an upper edge (i.e., the edge opposite the lower edge that is pivoted to the base 30) of the side wall 2a, 2b on which they are arranged.

[0035] In the preferred and illustrated embodiment, with particular reference to Figures 5 and 6, the retention means 40 comprise a retention wall 41, which is oblique with respect to the side walls 2a, 2b, 2c, 2d and on which, in the open condition, the abutment elements 50 rest (see figure 5).

[0036] Also in this preferred embodiment, the retention means 40 are furthermore elastically deformable and/or elastically rotatable toward the outside of the container 10 at least up to a position (shown in Figure 6) in which the retention wall 41 releases the adjacent abutment element 50, allowing the rotation of the side wall 2c, 2d with which said abutment element 50 is integral toward the closed position.

[0037] The characteristic of the retention means of being elastically deformable and/or elastically rotatable (i.e., of returning spontaneously to the initial position in the absence of a force that pushes them to rotate and/or

to deform outward), in the preferred embodiment, is obtained by virtue of the shape and the mechanical characteristics of the plastic material of which they are made; in other embodiments it can be obtained by virtue of the presence of elastic means (for example a spring).

[0038] In the example shown, in fact, the retention means 40 are constituted by flexible portions of the first side wall 2a and of the second side wall 2b having a wedge-like shape in cross-section.

[0039] In this manner, in the preferred embodiment, in the open condition, a force applied at the upper edge of the third side wall 2c (or of the fourth side wall 2d) in the direction of the inside of the container 10 and having an intensity that exceeds a threshold value pushes the retention means 40 which contrast the rotation of the third side wall 2c (or of the fourth side wall 2d) to deform and/or rotate toward the outside of the container 10 (due to the inclined plane effect of the retention wall 41) at least up to the position in which the corresponding retention walls 41 release the adjacent abutment elements 50, allowing the rotation of said third side wall 2c (or fourth side wall 2d) toward the closed position.

[0040] Advantageously, again with reference to Figures 5 and 6, the retention means 40 comprise an internal sliding wall 42, which faces the inside of the container 10 and is inclined with respect to the side wall 2a, 2b on which the retention means 40 is placed. More precisely, the internal sliding walls 42 of the retention means 40, in the open condition, lie on an ideal vertical plane which is rotated, with respect to the corresponding side wall 2a, 2b, toward the inside of the container 10, so that the third side wall 2c and the fourth side wall 2d, during the rotation from the closed position to the open position, slide along said internal sliding walls 42, pushing the retention means 40 to rotate and/or deform elastically toward the outside of the container 10, without being blocked by them.

[0041] Going back to the general features of the invention, according to the invention, the container 10 comprises at least two release elements 60, of which one is coupled to the third side wall 2c, on an external face thereof, and one is coupled to the fourth side wall 2d, on an external face thereof.

[0042] In greater detail, each release element 60 comprises a central portion 61, which is adapted to be pushed manually and connected by means of two opposite connecting portions 62 to two opposite pusher ends 63, each adapted to interact mechanically with one of the retention means 40.

[0043] Each one of said release elements 60 is configured so that by pushing (or equivalently pulling) its central portion 61 (for example upward) a force is transmitted to the pusher portions 63, by means of the connecting portions 62, which induces said pusher portions 63 to interact mechanically with the retention means 40 (for example by pushing them directly), moving and/or deforming them so as to allow the rotation toward the closed position of the side wall 2d, 2c, to which the pushed re-

lease element 60 is coupled. The effect of a vertical thrust on a release element 60 is shown for example in Figures 3 and 6.

[0044] Preferably, each one of the release elements 60 is constituted by a single monolithic piece which is elastically deformable following a thrust applied to the central portion 61 and is even more preferably made of plastic.

[0045] A preferred embodiment of the release element 60 is shown in particular in Figures 9-12. In the example shown, the central portion 61 of said release element 60 comprises a horizontal wall 64, which is substantially parallel to the base 30 of the container 10 and is adapted to be pushed manually.

[0046] As is clear from the figures, the connecting portions 62 have an oblique longitudinal extension with respect to the horizontal wall 64, while the pusher portions 63 have a longitudinal extension on a plane that is substantially parallel to said horizontal wall 64.

[0047] Again in the preferred and illustrated embodiment, the pusher ends 63 have a substantially S-shaped profile, having two coplanar curves in opposite directions, and each one passes through an opening 21 provided on the side wall 2c, 2d to which the release element 60 is coupled, so as to reach the adjacent retention element 40 arranged on the internal face of the adjacent side wall 2a, 2b. Said openings 21 furthermore act as guide, retaining each pusher end 63 to slide along a horizontal direction.

[0048] In practice, in this constructive solution, the central portion 61, the connecting portions 62 and the pusher portions 63 are configured so that by applying a force in a vertical direction to the horizontal wall 64, the pusher portions 63 move along the same horizontal axis in opposite and divergent directions, pushing the retention means 40 adjacent thereto toward the outside of the container 10 and thus inducing them to free the rotation toward the closed position of the side wall 2d, 2c to which the release element 60 is coupled.

[0049] According to the invention the connecting portions 62 are provided with one or more first protrusions 66 (such as for example blocks or tabs or sliders), each of which can slide within an oblique slot 72 provided on the side wall 2c, 2d to which the release element 60 is coupled. Such oblique slots 72 are inclined mirror-symmetrically and act as a guide, retaining the movement of the connecting portions 62 along axes which are inclined with respect to the base 30 and diverge upward (away from the base 30).

[0050] As an alternative or preferably in addition to the presence of said first protrusions 66, the central portion 61 of the release elements 60 is provided with one or more second protrusions 65, each of which can slide within a vertical slot 71 provided on the side wall 2c, 2d to which the release element 60 is coupled. Said vertical slots 71 act as guide, retaining the movement of the central portion 61 along a vertical direction.

[0051] Advantageously, as shown in particular in Fig-

ure 10, the first protrusions 66 and/or the second protrusions 65 comprise flexible engagement tabs adapted to be attached to the slots 72, 71 within which they can slide, in order to provide the coupling of the release element 60 to the respective side wall 2c, 2d and more precisely so as to provide a snap coupling, i.e., of the type known as "snap-fit". The presence of this snap-fit engagement system comprising the flexible engagement tabs that engage with a snap fit inside the vertical slots 71 and/or the oblique slots 72 makes the assembly and optionally the replacement of the release elements 60 particularly easy and quick.

[0052] In the preferred and illustrated embodiment, there are two first protrusions 66, each one comprising a pair of flexible engagement tabs, each of which retains a connecting portion 62 of the release element 60 to an oblique slot 72; moreover, there are two second protrusions 65, each comprising a pair of flexible engagement tabs, which retain the central portion 61 of the release element 60 to two vertical slots 71.

[0053] In this manner, as shown in Figure 3, when the central portion 61 is pushed (or pulled) upward the central portion 61 slides vertically and simultaneously pushes the two connecting portions 62 to move in divergent directions, along the direction of the two oblique guides 72, deforming, in practice, the release element 60. Again following such movement, the two pusher portions 63, which are positioned at the distal ends of the connecting portions 62, are pushed horizontally along opposite directions, toward the outside of the container 10.

[0054] As shown in Figure 6, each one of the two pusher portions 63, by moving toward the outside of the container 10, pushes the retention means 40, making them rotate outward, interrupting the mechanical interaction between them and the adjacent abutment elements 50 and thus releasing the rotation toward the closed position of the side wall 2c, 2d to which the pushed release element 60 is coupled.

[0055] Preferably, the reversible fixing elements with which the container 10 is provided also comprise male-female locking systems 81 comprising male elements, which are arranged on the first side wall 2a and on the second side wall 2b and which, in a known manner, in the open condition, engage female elements, which are arranged on the third side wall 2c and on the fourth side wall 2d or male elements, which are arranged on the third side wall 2c and on the fourth side wall 2d, which in the open condition engage female elements arranged on the first side wall 2a and on the second side wall 2b.

[0056] Obviously, both male elements and female elements can be present equivalently on all four side faces 2a, 2b, 2c, 2d.

[0057] In the preferred embodiments, at least two opposite side walls 2a, 2b are provided, at the two lateral ends, with abutment shoulders 25 (perpendicular to the remainder of the wall 2a, 2b and protruding toward the center of the adjacent side wall 2c, 2d) on which, in the open condition, the adjacent side walls 2c, 2d rest inter-

nally.

[0058] In the example shown, the first side wall 2a and the second side wall 2b are provided with said abutment shoulders 25 on which, in the open condition, the second side wall 2c and the third side wall 2d rest and which prevent said side walls from rotating toward the outside of the container 10.

[0059] Conveniently, at least part of the male elements or of the female elements of the male-female locking systems 81 described previously are positioned on the abutment shoulders 25, so that by pushing the third side wall 2c and the fourth side wall 2d against said abutment shoulders 25 the mechanical coupling between the male elements and the female elements is provided.

[0060] The coupling between the male elements and the female elements of the male-female locking systems 81 renders the fixing of the container 10 in the open condition more stable.

[0061] All the elements described so far are preferably made of plastic material and even more preferably made of polypropylene.

[0062] Advantageously, all or part of the described elements can be provided by molding.

[0063] The operation of the rigid container with collapsible walls, although clear and evident from what has been described, is summarized briefly hereinafter with reference to the preferred and illustrated embodiment.

[0064] In the open condition, the rotation toward the closed position of the first side wall 2a and of the second side wall 2b is prevented by the presence, between them, of the third side wall 2c and of the fourth side wall 2d; while the rotation toward the closed position of the third side wall 2c and of the fourth side wall 2d is prevented by the retention means 40 on which the abutment elements 50 rest.

[0065] In order to pass from the open condition to the closed condition, the central portions 61 of the release elements 60 are pushed (or pulled) upward one at a time or simultaneously. As already clarified in detail, the upward movement of the release elements 60 pushes, by means of the pusher ends 63, the retention means 40 in the direction of the outside of the container 10, thus releasing the rotation of the third side wall 2c and of the fourth side wall 2d toward the closed position (toward the inside of the container 10). It is thus possible to rotate the third side wall 2c and the fourth side wall 2d, one at a time or simultaneously, up to the closed position, folding them onto the base 30, resting thereon.

[0066] As an alternative, it is possible to impart a strong enough impulse (for example by hitting with a hand or a tool) on the upper edge of the third side wall 2c and the fourth side wall 2d, inward, to make the retention means 40 rotate and/or flex and make said third side wall 2c and said fourth side wall 2d rotate toward the closed position.

[0067] Once the third side wall 2c and the fourth side wall 2d have been folded, the first side wall 2a and the second side wall 2b are also free to rotate toward the closed position and can thus be folded, one at a time or

simultaneously, over the third and fourth side walls 2c, 2d, thus providing the closed condition of the container 10.

[0068] In order to pass from the closed condition to the open condition it is sufficient to rotate outward, up to the open position, first the first and second side walls 2a, 2b and then the third and fourth side walls 2c, 2d.

[0069] The elasticity of the retention means 40 and the internal sliding surface 42 cause the retention means to not hinder the rotation of the third side wall 2c and of the fourth side wall 2d toward the open position and cause, once said side walls have reached the open position, said retention means 40 to arrange themselves in front of the abutment elements 50 with the retention wall 41 in contact with said abutment elements 50, thus hindering the return rotation toward the closed position.

[0070] Optionally, a thrust toward the outside of the container 10 applied to the third side wall 2c and to the fourth side wall 2d produces the mutual coupling of the male and female elements of the male-female locking systems.

[0071] It should be noted that in order to release the transition from the open condition to the closed condition the only operation necessary is to push (or pull) upward the release element 60, an operation which, by virtue of the particular shape and position of the release element 60, can be performed easily with one hand. Vice versa, in order to provide locking in the open condition, no operation is necessary except making the side walls 2a, 2b, 2c, 2d rotate.

[0072] Since the operations for passing from the open condition to the closed condition, and vice versa, are so simple, they can be performed easily by means of automated systems.

[0073] In practice it has been found that the rigid container with collapsible walls according to the present invention achieves the intended aim and objects, since it allows to pass from the closed condition to the open condition, and vice versa, in a quicker, more convenient and easier manner than the background art.

[0074] Another advantage of the rigid container with collapsible walls according to the invention resides in that it allows to provide a more reliable fixing in the open condition than the background art.

[0075] A further advantage of the rigid container with collapsible walls according to the invention resides in that it provides an ergonomic improvement of the manual opening and closing operations with respect to the background art.

[0076] Another advantage of the rigid container with collapsible walls according to the invention resides in that it can be opened and closed by means of automated systems.

[0077] Yet another advantage of the rigid container with collapsible walls according to the invention resides in that it is easy to provide and economically competitive if compared with the background art.

[0078] The rigid container with collapsible walls thus

conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims.

Claims

1. A rigid container (10) with collapsible walls, which can be configured in an open condition, in which it is substantially shaped like a hollow parallelepiped, and in a closed condition, in which it has a flattened shape, comprising:

- a substantially quadrangular base (30) and
- a first side wall (2a) which lies opposite a second side wall (2b) and is adjacent to a third side wall (2c) and to a fourth side wall (2d);

each one of said four side walls (2a, 2b, 2c, 2d) being pivoted with a lower edge to one of the four sides of the base (30), so that it can be rotated at least between a closed position, in which it is folded onto said base (30), and an open position, in which it is substantially perpendicular to said base (30);

said side walls (2a, 2b, 2c, 2d) comprising reversible fixing elements for the mutual mechanical coupling of each side wall (2a, 2b, 2c, 2d) with the side walls (2a, 2b, 2c, 2d) that are adjacent thereto, in order to fix the side walls (2a, 2b, 2c, 2d) in the open position; in said open condition all four side walls (2a, 2b, 2c, 2d) being fixed in said open position,

said reversible fixing elements comprising retention means (40), arranged on the first side wall (2a) and on the second side wall (2b), which, in the open condition, interact mechanically with adjacent abutment elements (50) which are arranged on the third side wall (2c) and on the fourth side wall (2d) so as to contrast the rotation of at least said third side wall (2c) and said fourth side wall (2d) toward said closed position,

and further comprising at least two release elements (60), of which one is coupled to said third side wall (2c), on an external face thereof, and one is coupled to said fourth side wall (2d), on an external face thereof, and each release element comprising:

- a central portion (61), which is adapted to be pushed manually and connected by means of two opposite connecting portions (62) to two opposite pusher ends (63), each adapted to interact mechanically with one of said retention means (40);

each one of said release elements (60) being configured so that by pushing said central portion (61) a force is transmitted to said pusher portions (63), by means of said connecting portions (62), and induces said pusher portions (63) to interact mechan-

ically with said retention means (40), moving and/or deforming them so as to allow the rotation toward said closed position of the side wall (2c, 2d), to which said release element (60) is coupled, **characterized in that** said connecting portions (62) are provided with one or more first protrusions (66), each of which can slide within an oblique slot (72) that is provided on the side wall (2c, 2d) to which the release element (60) is coupled.

2. The container according to claim 1, **characterized in that** said central portion (61) comprises a horizontal wall (64), which is substantially parallel to said base (30) and is adapted to be pushed manually and **in that** said connecting portions (62) have a longitudinal extension that is oblique with respect to said horizontal wall (64);

said pusher portions (63) having a longitudinal extension on a plane that is substantially parallel to said horizontal wall (64);

said central portion (61), said connecting portions (62) and said pusher portions (63) being thus configured so that by applying a force in a vertical direction on said horizontal wall (64) said pusher portions (63) move along the same horizontal axis in opposite directions, pushing the retention means (40) in the direction of the outside of the container (10).

3. The container according to claim 1 or 2, **characterized in that** said release elements (60) are each constituted by a single monolithic part which is elastically deformable as a consequence of a thrust applied to said central portion (61).

4. The container (10) according to one or more of the preceding claims, **characterized in that** said central portion (61) is provided with one or more second protrusions (65), each of which can slide within a vertical slot (71) that is provided on the side wall (2c, 2d) to which the release element (60) is coupled.

5. The container (10) according to claim 4, **characterized in that** said first protrusions (66) and/or said second protrusions (65) comprise flexible engagement tabs which are adapted to engage the slots (71, 72) inside which they can slide in order to provide the coupling of said release element (60) to the respective side wall (2c, 2d).

6. The container (10) according to one or more of the preceding claims, **characterized in that** said retention means (40):

are arranged proximate to an upper edge, which lies opposite said lower edge, of the side wall (2a, 2b) on which they are arranged, comprise a retention wall (41), which is oblique with respect to the side walls (2a, 2b, 2c, 2d)

and on which, in the open condition, said abutment elements (50) rest

and are elastically deformable and/or rotatable toward the outside of said container (10) at least to a position in which said retention wall (41) frees the adjacent abutment element (50), allowing the rotation of the respective side wall (2c, 2d) toward said closed position,

so that in the open condition a force applied at the upper edge of the third side wall (2c) or of the fourth side wall (2d) in the direction of the inside of the container (10) and having an intensity that exceeds a threshold value pushes the retention means (40) which contrast the rotation of said third side wall (2c) or fourth side wall (2d) so as to deform and/or rotate toward the outside of said container (10) at least to the position in which the corresponding retention walls (41) release the adjacent abutment elements (50), allowing the rotation of said third side wall (2c) or fourth side wall (2d) toward said closed position.

7. The container (10) according to one or more of the preceding claims, **characterized in that** each one of said retention means (40) is constituted by a flexible portion of said first side wall (2a) and said second side wall (2b).

8. The container (10) according to one or more of the preceding claims, **characterized in that** said retention means (40) comprise an internal sliding wall (42), which faces the inside of the container (10), is inclined with respect to the side wall (2a, 2b) on which the retention means (40) is arranged, and on which the third side wall (2c) and the fourth side wall (2d), during rotation from the closed position to the open position, slide, pushing the retention means (40) so that they rotate and/or deform elastically toward the outside of the container (10), without being locked by them.

9. The container (10) according to one or more of the preceding claims, **characterized in that** the reversible fixing elements also comprise male-female locking systems (81), which in turn comprise:

- male elements, which are arranged on the first side wall (2a) and on the second side wall (2b) and which, in the open condition, engage female elements, which are arranged on the third side wall (2c) and on the fourth side wall (2d) and/or

- male elements, which are arranged on the third side wall (2c) and on the fourth side wall (2d) and which, in the open condition, engage female elements arranged on the first side wall (2a) and on the second side wall (2b).

10. The container (10) according to one or more of the preceding claims, **characterized in that** at least two opposite side walls (2a, 2b) are provided, at the two lateral ends, with abutment shoulders (25) on which, in the open condition, the adjacent side walls (2c, 2d) rest.

Patentansprüche

1. Starrer Behälter (10) mit faltbaren Wänden, der in einem offenen Zustand konfiguriert werden kann, in dem er im Wesentlichen wie ein hohles Parallelepiped geformt ist, und in einem geschlossenen Zustand, in dem er eine abgeflachte Form hat, aufweisend:

- einen im Wesentlichen viereckigen Boden (30) und

- eine erste Seitenwand (2a), die einer zweiten Seitenwand (2b) gegenüberliegt und einer dritten Seitenwand (2c) und einer vierten Seitenwand (2d) benachbart ist;

wobei jede der vier Seitenwände (2a, 2b, 2c, 2d) mit einer unteren Kante zu einer der vier Seiten des Bodens (30) schwenkbar ist, so dass sie wenigstens zwischen einer geschlossenen Position, in der sie auf dem Boden (30) gefaltet ist, und einer offenen Position, in der sie im Wesentlichen senkrecht zu dem Boden (30) ist, gedreht werden kann;

wobei die Seitenwände (2a, 2b, 2c, 2d) reversible Fixierelemente zur gegenseitigen mechanischen Verbindung jeder Seitenwand (2a, 2b, 2c, 2d) mit den Seitenwänden (2a, 2b, 2c, 2d), die benachbart dazu sind, aufweisen, um die Seitenwände (2a, 2b, 2c, 2d) in der offenen Position zu fixieren, wobei in dem offenen Zustand alle vier Seitenwände (2a, 2b, 2c, 2d) in der offenen Position fixiert sind,

wobei die reversiblen Fixierelemente Rückhaltemittel (40) aufweisen, die an der ersten Seitenwand (2a) und an der zweiten Seitenwand (2b) angeordnet sind und, in dem offenen Zustand, mechanisch mit benachbarten Anschlagselementen (50) wechselwirken, die an der dritten Seitenwand (2c) und an der vierten Seitenwand (2d) angeordnet sind, um der Drehung von wenigstens der dritten Seitenwand (2c) und der vierten Seitenwand (2d) in Richtung der geschlossenen Position entgegenzuwirken, und des Weiteren wenigstens zwei Freigabeelemente (60) aufweisend, von denen eines mit der dritten Seitenwand (2c) an einer Außenfläche davon verbunden ist, und eines mit der vierten Seitenwand (2d) an einer Außenfläche davon verbunden ist, und wobei jedes Freigabeelement aufweist:

einen mittleren Abschnitt (61), der dazu ausgelegt ist, manuell geschoben und mittels zweier

gegenüberliegender Verbindungsabschnitte (62) mit zwei entgegengesetzten Schubenden (63), die jeweils dazu ausgelegt sind, mechanisch mit einem der Rückhaltemittel (40) zu wechselwirken, verbunden zu werden; wobei jedes der Freigabeelemente (60) derart konfiguriert ist, dass durch Schieben des mittleren Abschnitts (61) mittels der Verbindungsabschnitte (62) eine Kraft auf die Schubabschnitte (63) übertragen wird und veranlasst, dass die Schubabschnitte (63) mit den Rückhaltemitteln (40) mechanisch wechselwirken, wodurch sie bewegt und/oder verformt werden, um die Drehung in Richtung der geschlossenen Position der Seitenwand (2c, 2d), mit der das Freigabeelement (60) verbunden ist, zu ermöglichen, **dadurch gekennzeichnet, dass** die Verbindungsabschnitte (62) mit einem oder mehreren ersten Vorsprüngen (66) versehen sind, von denen jeder in einem schrägen Schlitz (72) gleiten kann, der an der Seitenwand (2c, 2d), mit der das Freigabeelement (60) verbunden ist, vorgesehen ist.

2. Behälter nach Anspruch 1, **dadurch gekennzeichnet, dass** der mittlere Abschnitt (61) eine horizontale Wand (64) aufweist, die im Wesentlichen parallel zu der Basis (30) ist und dazu ausgelegt ist, manuell geschoben zu werden,

und dass die Verbindungsabschnitte (62) einen länglichen Fortsatz haben, der bezüglich der horizontalen Wand (64) schräg ist; wobei die Schubabschnitte (63) einen länglichen Fortsatz in einer Ebene haben, die im Wesentlichen parallel zu der horizontalen Wand (64) ist; wobei der mittlere Abschnitt (61), die Verbindungsabschnitte (62) und die Schubabschnitte (63) somit so konfiguriert sind, dass sich durch Aufbringen einer Kraft in einer vertikalen Richtung auf die horizontale Wand (64) die Schubabschnitte (63) entlang derselben horizontalen Achse in entgegengesetzten Richtungen bewegen, wodurch die Rückhaltemittel (40) in Richtung der Außenseite des Behälters (10) geschoben werden.

3. Behälter nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die Freigabeelemente (60) jeweils aus einem einzigen monolithischen Teil gebildet sind, das als Folge eines auf den mittleren Abschnitt (61) aufgebrachten Schubs elastisch verformbar ist.
4. Behälter (10) nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der mittlere Abschnitt (61) mit einem oder mehreren zweiten Vorsprüngen (65) versehen ist, von

denen jeder in einem vertikalen Schlitz (71) gleiten kann, der an der Seitenwand (2c, 2d) vorgesehen ist, mit der das Freigabeelement (60) verbunden ist.

5. Behälter (10) nach Anspruch 4, **dadurch gekennzeichnet, dass** die ersten Vorsprünge (66) und/oder die zweiten Vorsprünge (65) flexible Eingriffslaschen aufweisen, die dazu ausgelegt sind, in die Schlitz (71, 72) einzugreifen, in denen sie gleiten können, um die Verbindung des Freigabeelements (60) mit der entsprechenden Seitenwand (2c, 2d) vorzusehen.

6. Behälter (10) nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Rückhaltemittel (40) :

angeordnet sind nahe einer oberen Kante, die gegenüber der unteren Kante der Seitenwand (2a, 2b) liegt, an der sie angeordnet sind, eine Rückhaltewand (41) aufweisen, die bezüglich der Seitenwände (2a, 2b, 2c, 2d) schräg ist, und auf der im offenen Zustand die Anschlagselemente (50) ruhen, und in Richtung der Außenseite des Behälters (10) wenigstens in eine Position elastisch verformbar und/oder drehbar sind, in der die Rückhaltewand (41) das benachbarte Anschlagselement (50) freigibt, wodurch die Drehung der entsprechenden Seitenwand (2c, 2d) in Richtung der geschlossenen Position ermöglicht wird, so dass im offenen Zustand eine Kraft, die an der oberen Kante der dritten Seitenwand (2c) oder der vierten Seitenwand (2d) in Richtung des Inneren des Behälters (10) aufgebracht wird und eine Stärke hat, die einen Schwellenwert überschreitet, die Rückhaltemittel (40) schiebt, die der Drehung der dritten Seitenwand (2c) oder der vierten Seitenwand (2d) entgegenwirken, um sich in Richtung der Außenseite des Behälters wenigstens bis zu der Position, in der die korrespondierenden Rückhaltewände (41) die benachbarten Anschlagselemente (50) freigeben, zu verformen und/oder zu drehen, wodurch die Drehung der dritten Seitenwand (2c) oder der vierten Seitenwand (2d) in Richtung der geschlossenen Position ermöglicht wird.

7. Behälter (10) nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** jedes der Rückhaltemittel (40) aus einem flexiblen Abschnitt der ersten Seitenwand (2a) und der zweiten Seitenwand (2b) besteht.

8. Behälter (10) nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Rückhaltemittel (40) eine innere Gleitwand (42) aufweisen, die der Innenseite des Behälters (10)

zugewandt ist, bezüglich der Seitenwand (2a, 2b), an der die Rückhaltemittel (40) angeordnet sind, geneigt ist, und an der die dritte Seitenwand (2c) und die vierte Seitenwand (2d) während der Drehung von der geschlossenen Position in die offene Position gleiten, wodurch die Rückhaltemittel (40) geschoben werden, so dass sie sich in Richtung der Außenseite des Behälters (10) drehen und/oder elastisch verformen, ohne von ihnen verriegelt zu werden.

9. Behälter (10) nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die reversiblen Fixierelemente auch Stecker-Buchse-Verriegelungssysteme (81) aufweisen, die wiederum aufweisen:

- Steckerelemente, die an der ersten Seitenwand (2a) und an der zweiten Seitenwand (2b) angeordnet sind, und die, im offenen Zustand, in Buchsenelemente eingreifen, die an der dritten Seitenwand (2c) und an der vierten Seitenwand (2d) angeordnet sind, und/oder
- Steckerelemente, die an der dritten Seitenwand (2c) und an der vierten Seitenwand (2d) angeordnet sind, und die, im offenen Zustand, in Buchsenelemente eingreifen, die an der ersten Seitenwand (2a) und an der zweiten Seitenwand (2b) angeordnet sind.

10. Behälter (10) nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** wenigstens zwei entgegengesetzte Seitenwände (2a, 2b) an den zwei seitlichen Enden mit Anschlagsschultern (25) versehen sind, auf denen im offenen Zustand die benachbarten Seitenwände (2c, 2d) ruhen.

Revendications

1. Conteneur rigide (10) avec des parois repliables, qui peut être configuré dans un état ouvert, dans lequel il est sensiblement formé comme un parallélépipède creux, et dans un état fermé, dans lequel il a une forme aplatie, comportant :

- une base sensiblement quadrangulaire (30) et
- une première paroi latérale (2a) qui se situe à l'opposé d'une deuxième paroi latérale (2b) et est adjacente à une troisième paroi latérale (2c) et à une quatrième paroi latérale (2d),

chacune desdites quatre parois latérales (2a, 2b, 2c, 2d) pivotant avec un bord inférieur sur l'un des quatre côtés de la base (30), de sorte qu'elle peut tourner au moins entre une position fermée, dans laquelle elle est pliée sur ladite base (30), et une position

ouverte, dans laquelle elle est sensiblement perpendiculaire à ladite base (30),

lesdites parois latérales (2a, 2b, 2c, 2d) comportant des éléments de fixation réversibles pour le couplage mécanique mutuel de chaque paroi latérale (2a, 2b, 2c, 2d) avec les parois latérales (2a, 2b, 2c, 2d) qui sont adjacentes à celle-ci, afin de fixer les parois latérales (2a, 2b, 2c, 2d) dans la position ouverte, dans ledit état ouvert, les quatre parois latérales (2a, 2b, 2c, 2d) étant toutes fixées dans ladite position ouverte,

lesdits éléments de fixation réversibles comportant des moyens de retenue (40), agencés sur la première paroi latérale (2a) et sur la deuxième paroi latérale (2b), qui, à l'état ouvert, interagissent mécaniquement avec des éléments de butée (50) adjacents qui sont agencés sur la troisième paroi latérale (2c) et sur la quatrième paroi latérale (2d) de manière à s'opposer à la rotation d'au moins ladite troisième paroi latérale (2c) et ladite quatrième paroi latérale (2d) vers ladite position fermée,

et comportant en outre au moins deux éléments de libération (60), dont l'un est couplé à ladite troisième paroi latérale (2c), sur une face externe de celle-ci, et l'un est couplé à ladite quatrième paroi latérale (2d), sur une face externe de celle-ci, et chaque élément de libération comportant :

- une partie centrale (61), qui est adaptée pour être poussée manuellement et reliée au moyen de deux parties de liaison opposées (62) à deux extrémités de poussoir (63) opposées, chacune étant adaptée pour interagir mécaniquement avec l'un desdits moyens de retenue (40),

chacun desdits éléments de libération (60) étant configuré de sorte qu'en poussant ladite partie centrale (61), une force est transmise auxdites parties de poussoir (63), au moyen desdites parties de liaison (62), et amène lesdites parties de poussoir (63) à interagir mécaniquement avec lesdits moyens de retenue (40), en les déplaçant et/ou en les déformant de manière à permettre la rotation vers ladite position fermée de la paroi latérale (2c, 2d), à laquelle ledit élément de libération (60) est couplé, **caractérisé en ce que** lesdites parties de liaison (62) sont pourvues d'une ou plusieurs premières saillies (66), dont chacune peut glisser à l'intérieur d'une fente oblique (72) qui est agencée sur la paroi latérale (2c, 2d) à laquelle l'élément de libération (60) est couplé.

2. Conteneur selon la revendication 1, **caractérisé en ce que** ladite partie centrale (61) comporte une paroi horizontale (64), qui est sensiblement parallèle à ladite base (30) et est adaptée pour être poussée manuellement et **en ce que** lesdites parties de liaison (62) ont une extension longitudinale qui est oblique par rapport à

ladite paroi horizontale (64),
 lesdites parties de poussoir (63) ayant une extension
 longitudinale sur un plan qui est sensiblement paral-
 lèle à ladite paroi horizontale (64),
 ladite partie centrale (61), lesdites parties de liaison 5
 (62) et lesdites parties de poussoir (63) étant ainsi
 configurées de sorte qu'en appliquant une force
 dans une direction verticale sur ladite paroi horizon-
 tale (64), lesdites parties de poussoir (63) se dépla- 10
 cent le long du même axe horizontal dans des direc-
 tions opposées, en poussant les moyens de retenue
 (40) dans la direction de l'extérieur du conteneur
 (10).

3. Conteneur selon la revendication 1 ou 2, **caractérisé** 15
en ce que lesdits éléments de libération (60) sont
 chacun constitués d'une seule partie monolithique
 qui est élastiquement déformable en conséquence
 d'une poussée appliquée à ladite partie centrale 20
 (61).

4. Conteneur (10) selon une ou plusieurs des revendi-
 cations précédentes, **caractérisé en ce que** ladite 25
 partie centrale (61) est pourvue d'une ou plusieurs
 secondes saillies (65), dont chacune peut glisser à
 l'intérieur d'une fente verticale (71) qui est agencée
 sur la paroi latérale (2c, 2d) à laquelle l'élément de
 libération (60) est couplé.

5. Conteneur (10) selon la revendication 4, **caractérisé** 30
en ce que lesdites premières saillies (66) et/ou les-
 dites secondes saillies (65) comportent des languet-
 tes d'engagement souples qui sont adaptées pour
 s'engager dans les fentes (71, 72) à l'intérieur des-
 quelles elles peuvent glisser afin d'assurer le cou- 35
 plage dudit élément de libération (60) à la paroi la-
 térale (2c, 2d) respective.

6. Conteneur (10) selon une ou plusieurs des revendi-
 cations précédentes, **caractérisé en ce que** lesdits 40
 moyens de retenue (40) :

sont agencés près d'un bord supérieur, qui
se situe à l'opposé dudit bord inférieur, de
la paroi latérale (2a, 2b) sur laquelle ils sont 45
agencés,
comportent une paroi de retenue (41), qui est
oblique par rapport aux parois latérales (2a,
2b, 2c, 2d) et sur laquelle, à l'état ouvert, lesdits
 éléments de butée (50) reposent 50
 et sont élastiquement déformables et/ou peu-
 vent tourner vers l'extérieur dudit conteneur (10)
 au moins jusqu'à une position dans laquelle la-
 dite paroi de retenue (41) libère l'élément de bu-
 tée (50) adjacent, en permettant la rotation de 55
 la paroi latérale (2c, 2d) respective vers ladite
 position fermée,
 de sorte qu'à l'état ouvert, une force appliquée

sur le bord supérieur de la troisième paroi laté-
 rale (2c) ou de la quatrième paroi latérale (2d)
 dans la direction de l'intérieur du conteneur (10)
 et ayant une intensité qui dépasse une valeur
 de seuil pousse les moyens de retenue (40) qui
 s'opposent à la rotation de ladite troisième paroi
 latérale (2c) ou quatrième paroi latérale (2d) de
 manière à déformer et/ou tourner vers l'extérieur
 dudit conteneur (10) au moins jusqu'à la position
 dans laquelle les parois de retenue (41) corres-
 pondantes libèrent les éléments de butée (50)
 adjacents, en permettant la rotation de ladite
 troisième paroi latérale (2c) ou quatrième paroi
 latérale (2d) vers ladite position fermée.

7. Conteneur (10) selon une ou plusieurs des revendi-
 cations précédentes, **caractérisé en ce que** chacun
 desdits moyens de retenue (40) est constitué d'une
 partie souple de ladite première paroi latérale (2a)
 et de ladite deuxième paroi latérale (2b).

8. Conteneur (10) selon une ou plusieurs des revendi-
 cations précédentes, **caractérisé en ce que** lesdits
 moyens de retenue (40) comportent une paroi de
 glissement interne (42), qui est dirigée vers l'intérieur
 du conteneur (10), est inclinée par rapport à la paroi
 latérale (2a, 2b) sur laquelle les moyens de retenue
 (40) sont agencés, et sur laquelle la troisième paroi
 latérale (2c) et la quatrième paroi latérale (2d), pen-
 dant une rotation de la position fermée à la position
 ouverte, glissent, en poussant les moyens de rete-
 nue (40) de sorte qu'ils tournent et/ou se déforment
 élastiquement vers l'extérieur du conteneur (10),
 sans être bloqués par eux.

9. Conteneur (10) selon une ou plusieurs des revendi-
 cations précédentes, **caractérisé en ce que** les élé-
 ments de fixation réversibles comportent également
 des systèmes de blocage mâle-femelle (81), qui
 comportent à leur tour :

- des éléments mâles, qui sont agencés sur la
 première paroi latérale (2a) et sur la deuxième
 paroi latérale (2b) et qui, à l'état ouvert, viennent
 en prise avec des éléments femelles, qui sont
 agencés sur la troisième paroi latérale (2c) et
 sur la quatrième paroi latérale (2d)
 et/ou
 - des éléments mâles, qui sont agencés sur la
 troisième paroi latérale (2c) et sur la quatrième
 paroi latérale (2d) et qui, à l'état ouvert, viennent
 en prise avec des éléments femelles, qui sont
 agencés sur la première paroi latérale (2a) et
 sur la deuxième paroi latérale (2b).

10. Conteneur (10) selon une ou plusieurs des revendi-
 cations précédentes, **caractérisé en ce qu'**au
 moins deux parois latérales opposées (2a, 2b) sont

pourvues, aux deux extrémités latérales, d'épaule-
ments de butée (25) sur lesquels, à l'état ouvert, les
parois latérales (2c, 2d) adjacentes reposent.

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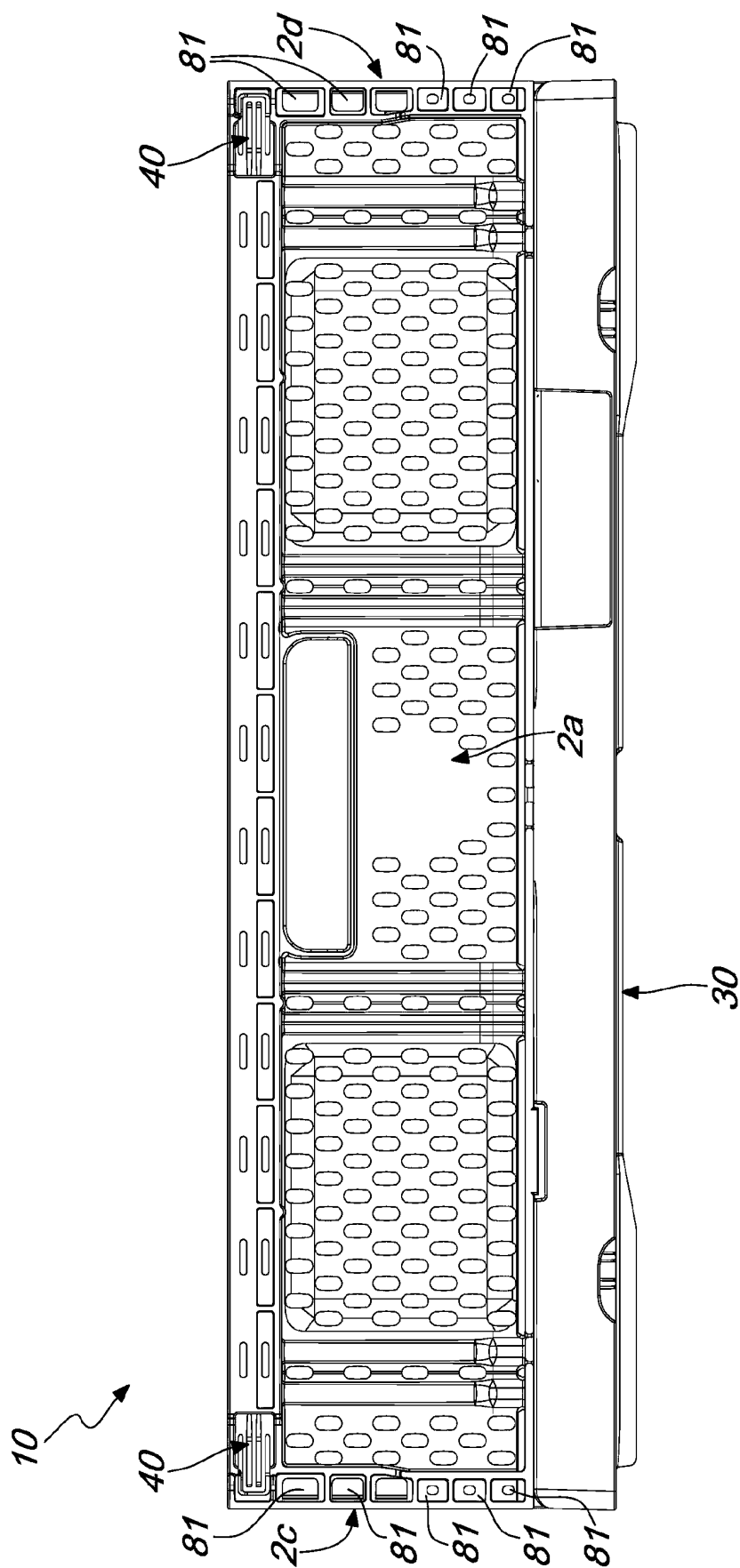
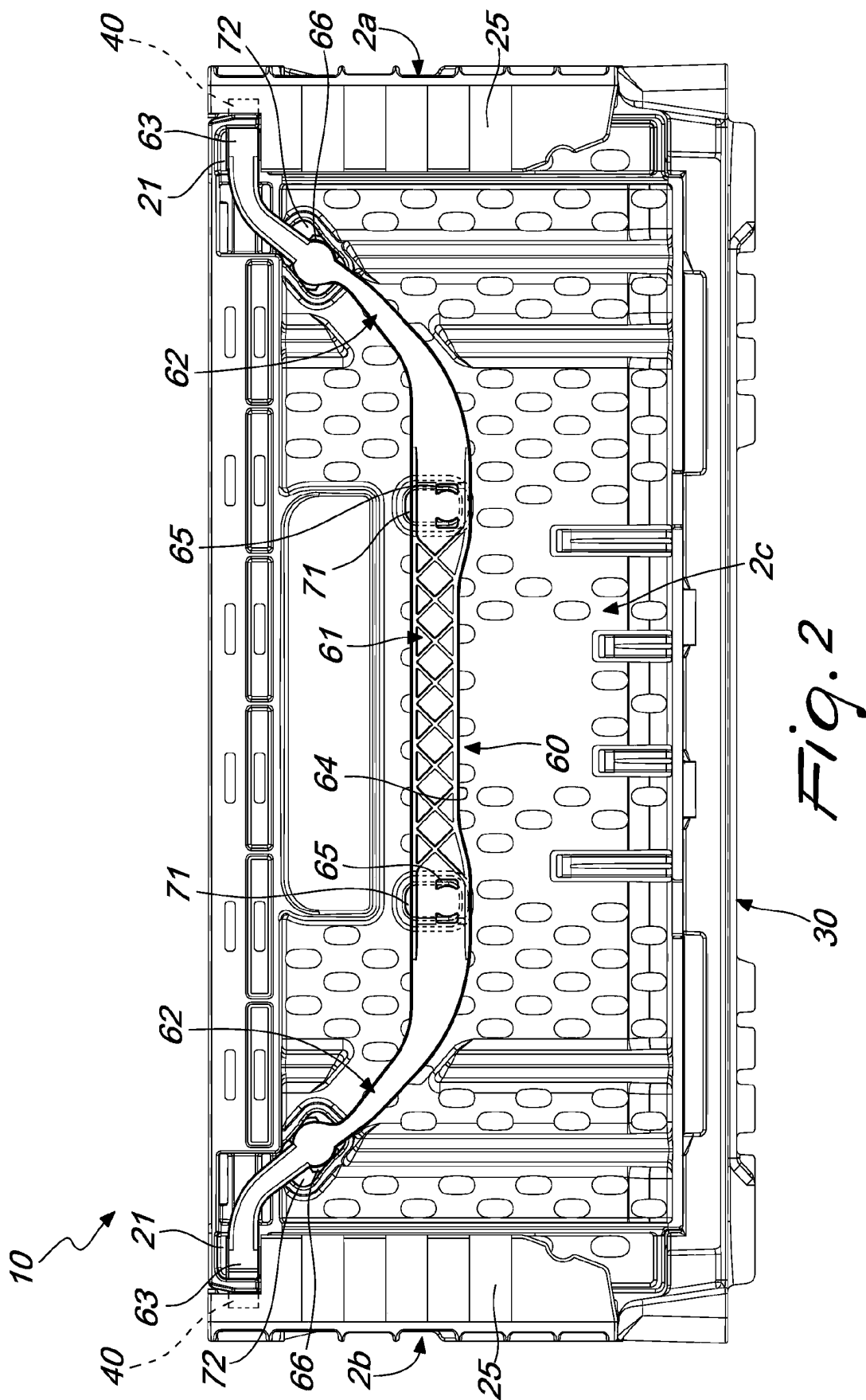


Fig. 1



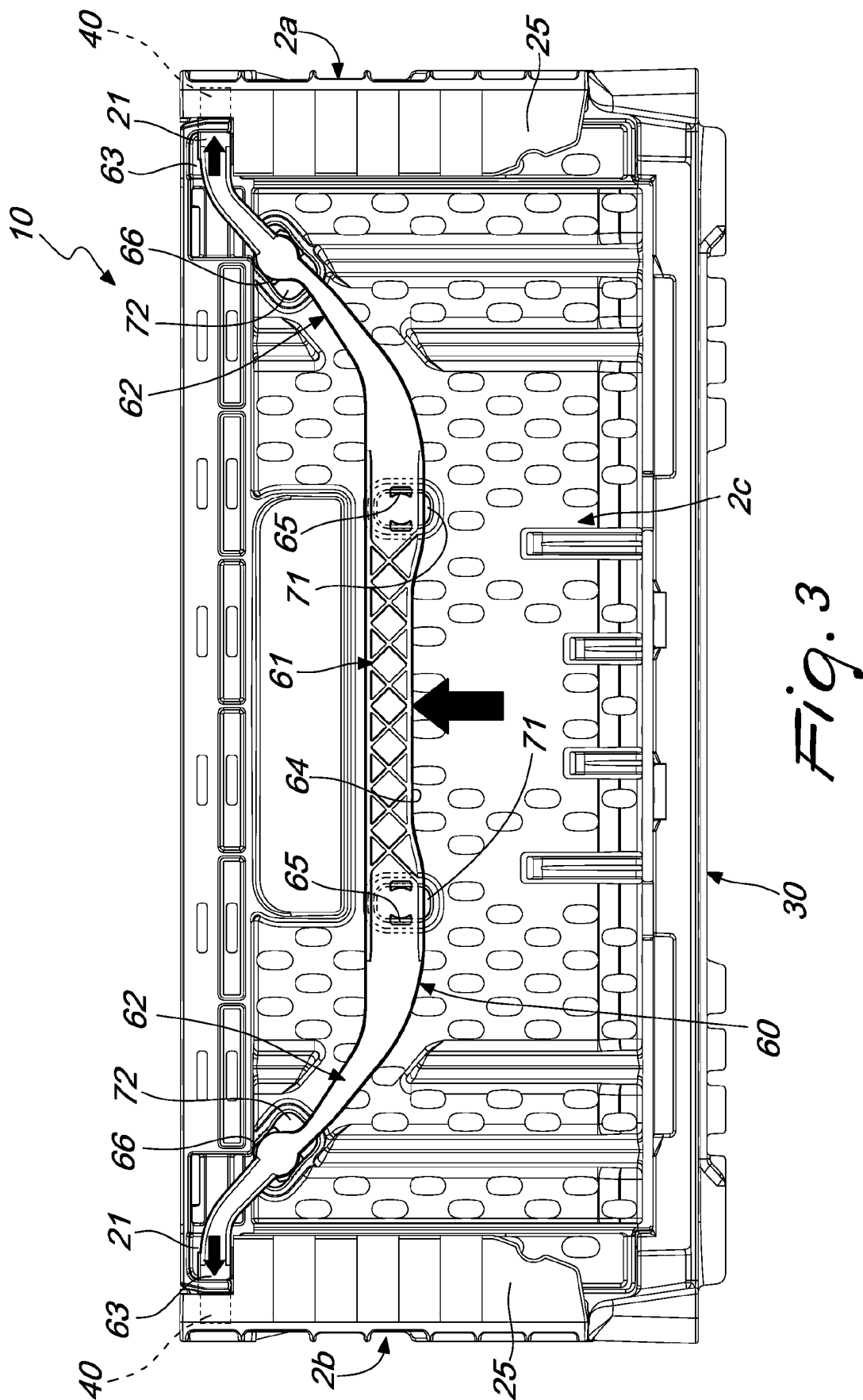
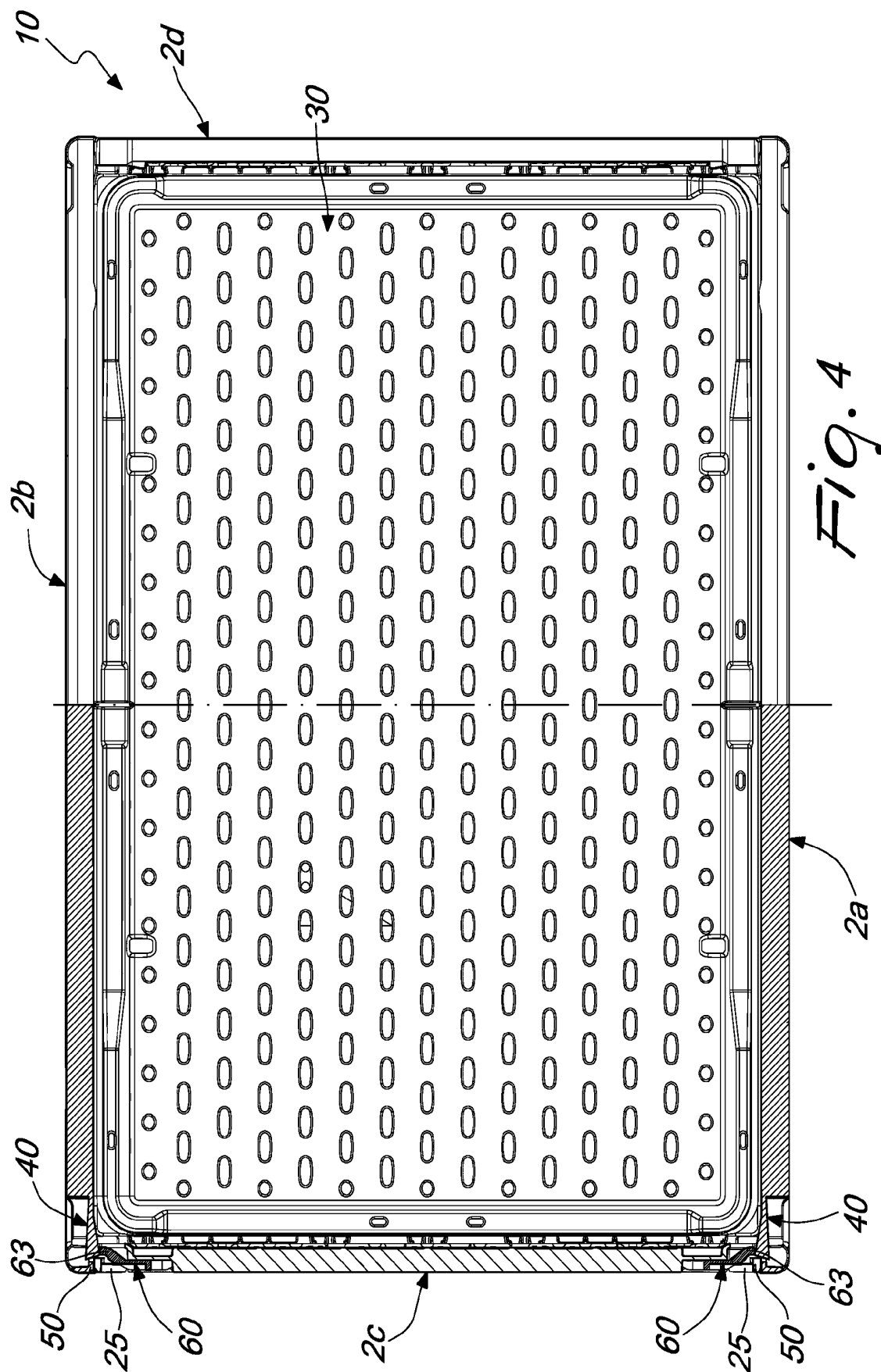


Fig. 3



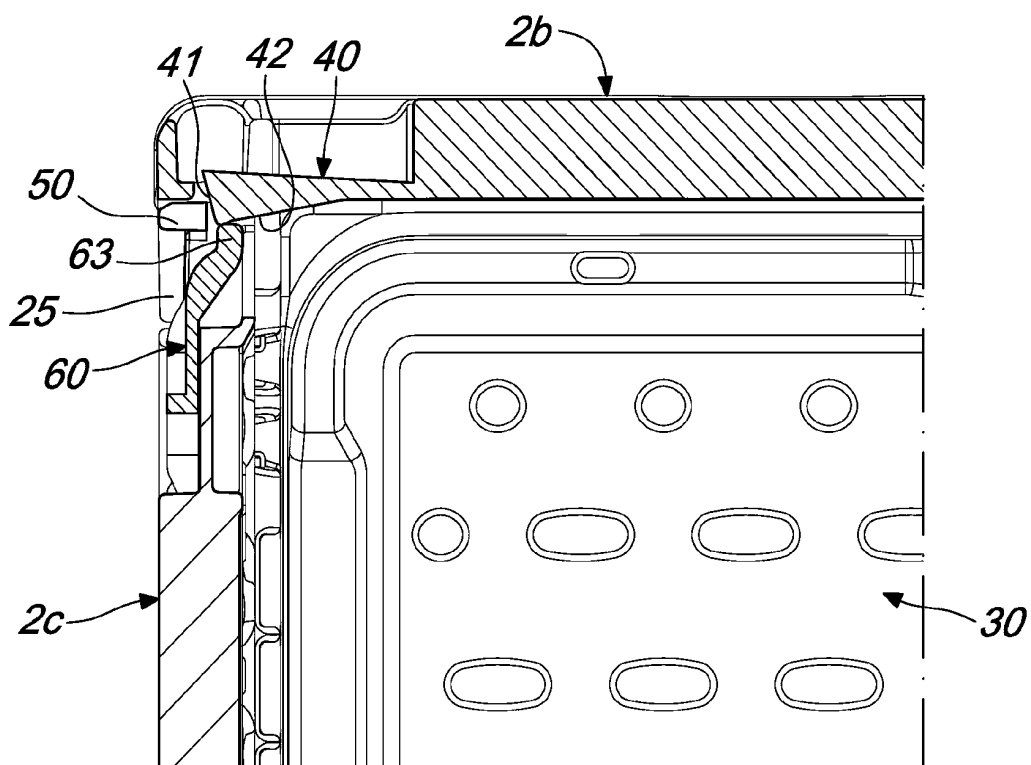


Fig. 5

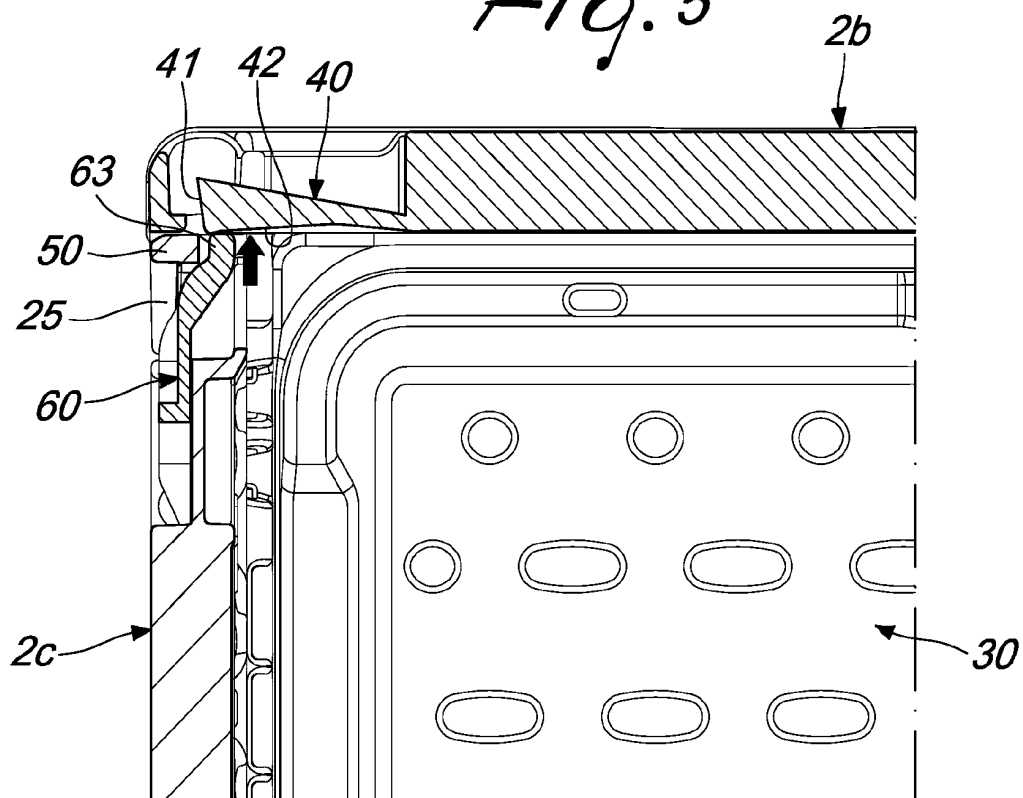


Fig. 6

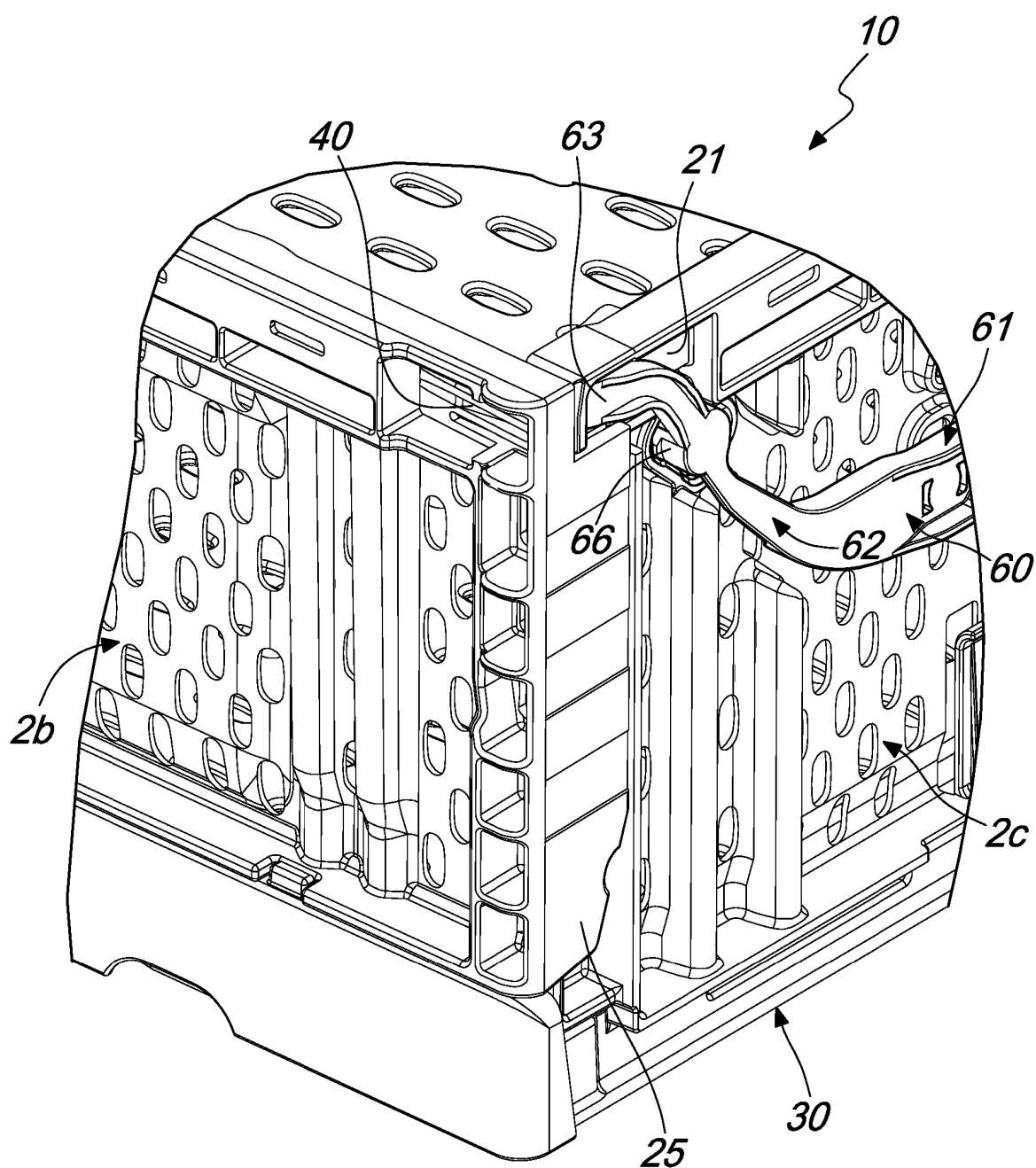


Fig. 7

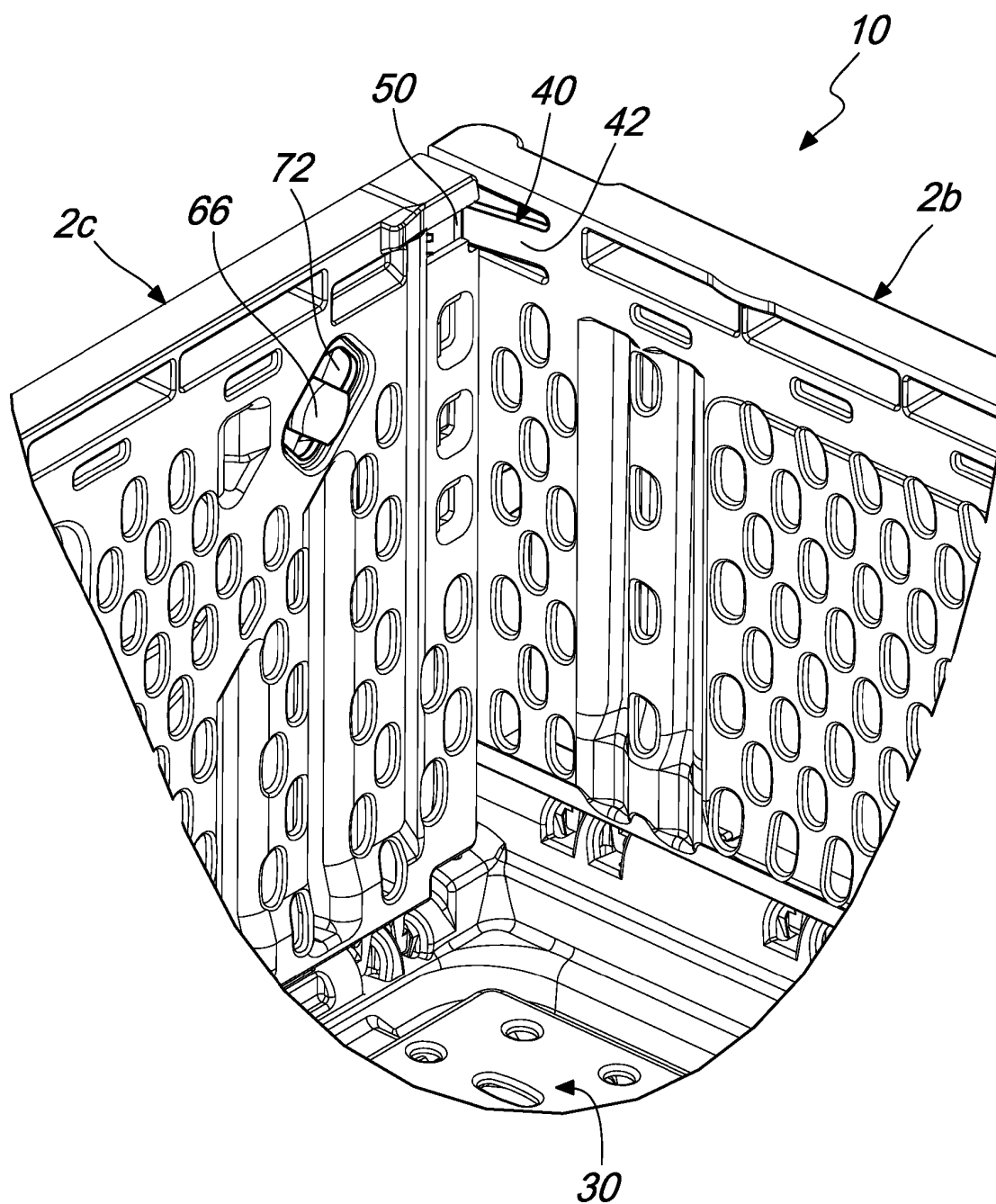
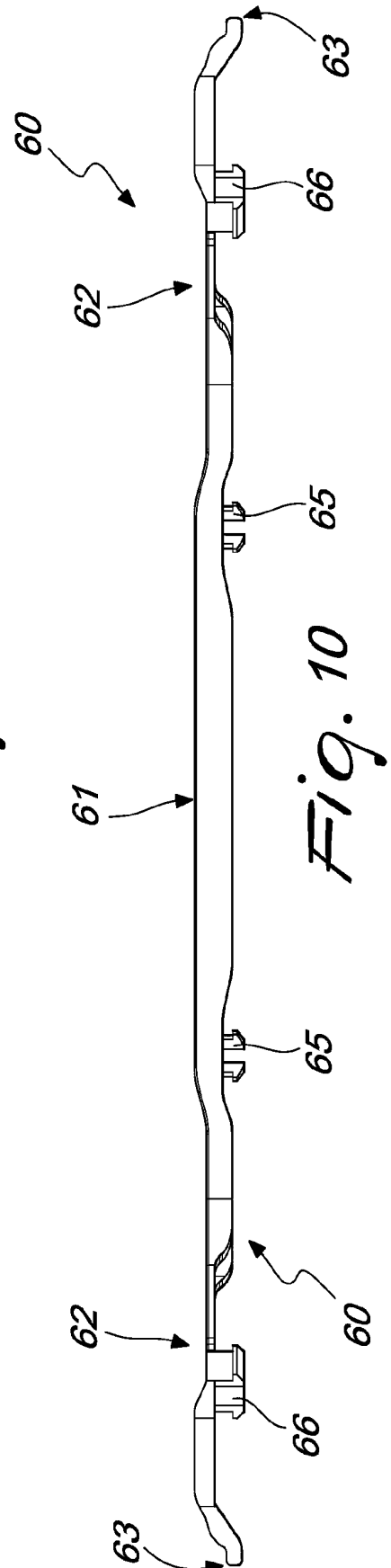
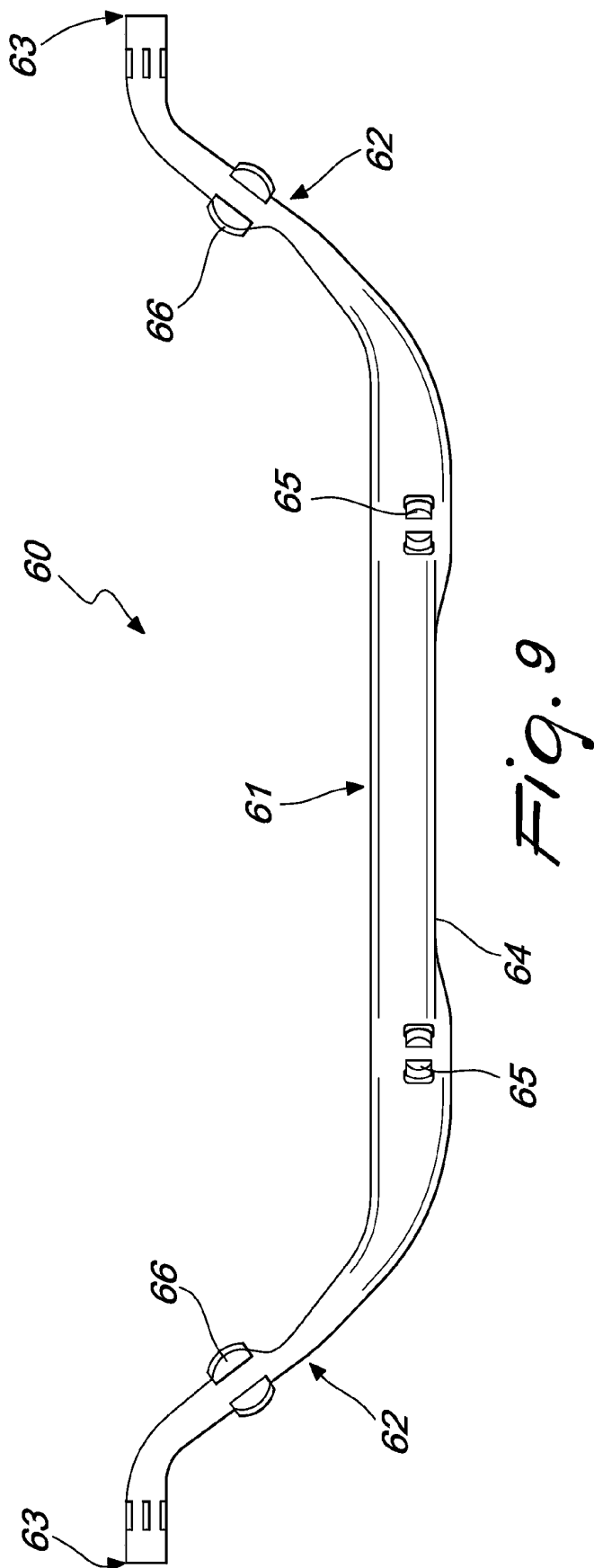
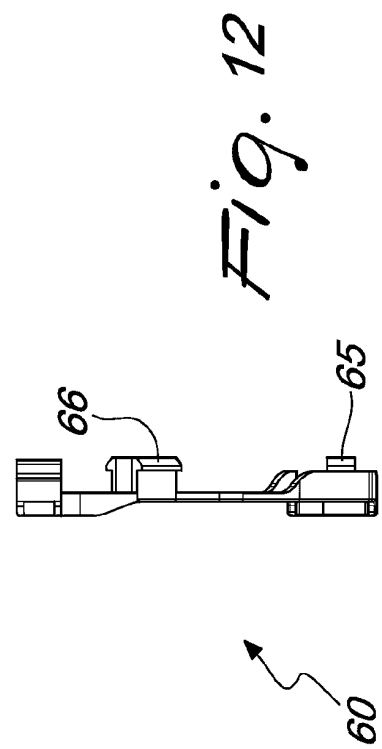
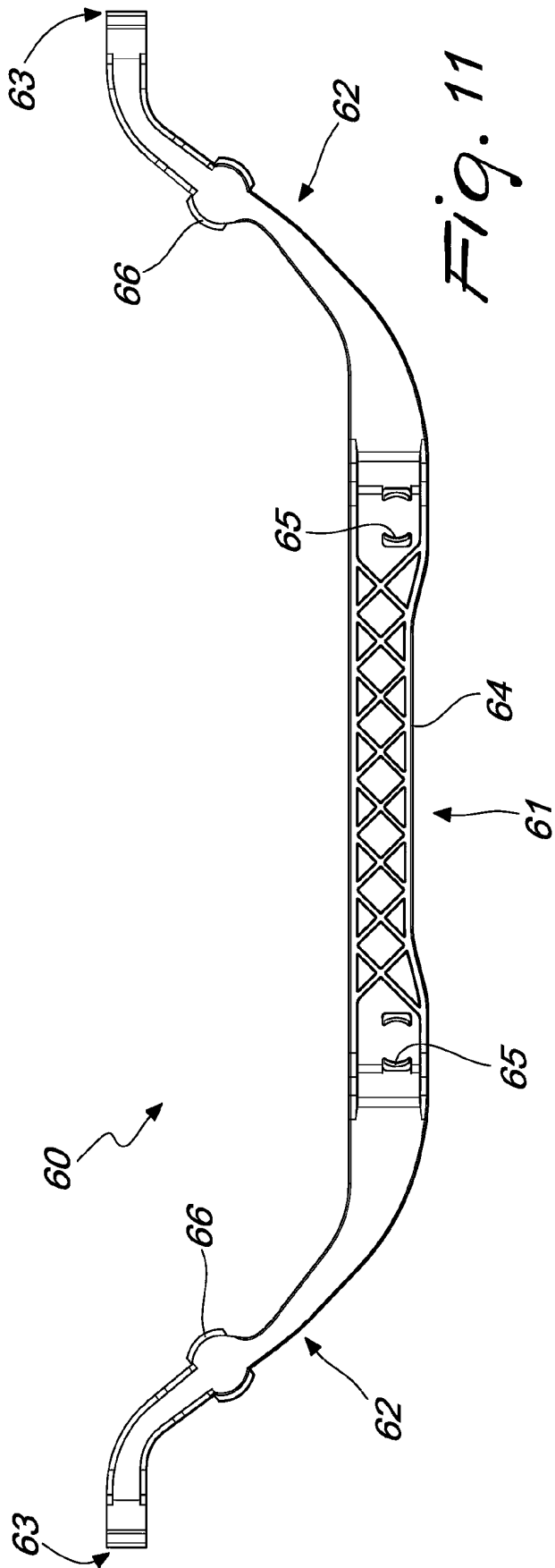


Fig. 8





REFERENCES CITED IN THE DESCRIPTION

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- US 6293418 B [0012]
- US 6290081 B [0012]