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(54) PALLET MODULE, ASSORTMENT OF PALLET MODULES, AND PALLET ASSEMBLY BUILT OF THE SAME

(57) Pallet module (10) configured to allow formation of a nested pallet assembly of at least two similar pallet modules, the pallet module comprising a main structural body (100) exhibiting a generally quadrilateral peripheral border (100A) with first to fourth lateral sides (101-104), first and second lateral flanges (110, 120) extending outwardly from the peripheral border along the first and second lateral sides (101, 102), the first and second lateral flanges being configured to cooperate with first and second lateral grooves (130, 140) extending inwardly from the peripheral border along the third and fourth lateral sides (103, 104) of another similar pallet module to form the nested pallet assembly, a foot structure (90) disposed on a lower side (100C) of the main structural body, and first and second toggle latch components (51, 52) arranged in the vicinity of the first and second lateral sides, respectively, configured to cooperate and releasably interlock with third and fourth toggle latch components (53, 54) arranged in the vicinity of the third and fourth lateral sides, respectively, of another similar pallet module of the nested pallet assembly.

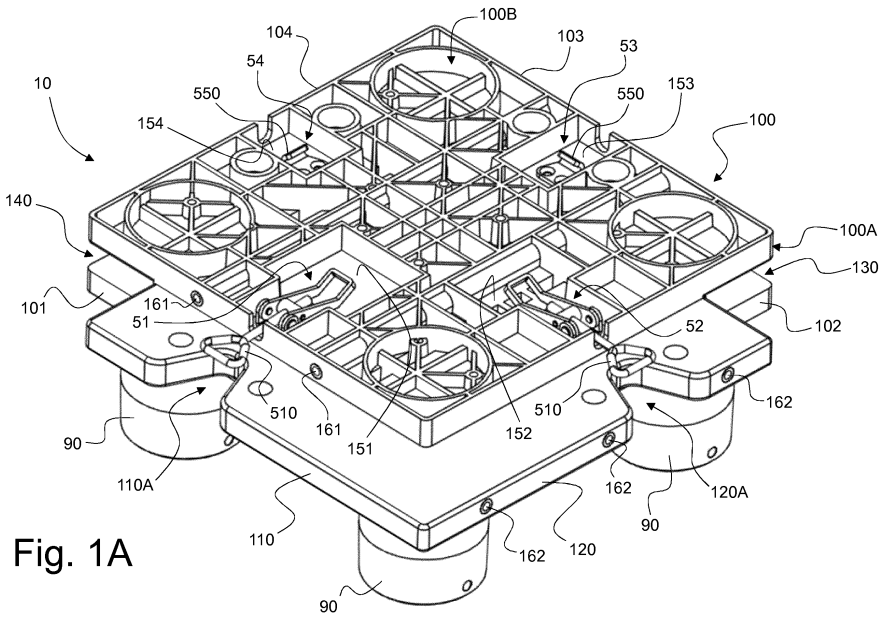

Fig. 1A

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Description

TECHNICAL FIELD

[0001] The present invention generally relates to a pallet module configured to allow formation of a nested pallet assembly of at least two similar pallet modules. The invention also relates to an assortment of such pallet modules produced in at least two different sizes, as well as to a pallet assembly built of multiple such pallet modules which are nested within and interlocked with one another.

BACKGROUND OF THE INVENTION

[0002] US Patent No. US 3,857,342 A discloses a pallet formed of nestable plastic modules each having four centrally located legs and four outwardly extending flanges, with each of the flanges having means for interlocking with the flanges of adjacent modules. While this solution is suitable for forming a nested pallet assembly of at least two pallet modules, the resulting pallet assembly is however insufficiently robust, the mating and interlocking system being prone to undesired release, leading to potential disconnection of the pallet modules during handling and/or transport of loads, which is clearly undesirable. This is especially critical for the transport of large loads.

[0003] The interlocking system contemplated in US Patent No. US 3,857,342 A is furthermore prone to breakage after repeated uses due to the inherent local deformations of the plastic material at the points of attachment between the pallet modules.

[0004] Other similar solutions are disclosed in US Patent No. US 5,105,746 A, Japanese Patent Publication No. JP (H) 5-85546 A, and International (PCT) Publication Nos. WO 98/31595 A1, WO 2017/023163 A1, WO 2017/200482 A1 and WO 2010/128261 A2.

[0005] These other known solutions likewise have drawbacks, including complex nesting and/or interlocking systems that unnecessarily complicate assembly and disassembly of multiple pallet modules one with, respectively from the other, which leads to reduced efficiency in usage.

[0006] A further problem with the aforementioned known pallet modules resides in that they are not optimized for shipment or warehousing of the individual pallet modules and components, especially due to the presence of feet that are typically made integral with a main structural body of the pallet module.

[0007] Another problem with the known pallet modules resides in the lack of flexibility thereof, especially in terms of sizes and dimensions which are not optimal and restrict the user's ability to build a large variety of pallet assemblies of varying sizes and dimensions for non-standard size goods or equipment. Furthermore, the height of the known pallet modules, and of the resulting pallet assemblies, is not optimized and the configuration thereof typically restricts the ability to use the full volume of the transport units and/or to efficiently stack individual pallet modules one above the other for e.g. shipment or warehousing purposes. This is especially the case for pallet modules comprising a foot structure that is made integral with the main structural body of the pallet modules.

[0008] As a consequence of these limitations, end users are typically led to make use of conventional wooden pallets, such as Euro-pallets and/or other non-standard wooden pallets for larger sized goods or equipment. Even though these wooden pallets can be produced in basically any sizes, and can be regarded as providing a reasonably flexible solution, they do not constitute an efficient solution for end users due to the fact that they are produced to meet specific needs and are typically intended for single use, which makes this solution cost inefficient and environmentally non-sustainable. As far as standard-size Euro-pallets are concerned, these are cheap to produce but, overall, their fixed size of 1200 mm x 800 mm x 144 mm (length x width x height) is not optimal when it comes to shipping and/or warehousing individual pallets and/or for the packaging and shipment of goods or equipment requiring a specific, non-standard pallet solution. The existing solutions do not therefore provide flexibility and adaptability in terms of pallet sizes, which is important for transport, packaging and cost efficiency. Conventional wooden pallets are furthermore not very robust and are prone to breakage, meaning that their usability and life cycle is typically limited to single use. Standard-sized pallets like the Euro-pallets do not furthermore constitute an optimal solution for shipment of goods or equipment having non-standard sizes and dimensions.

SUMMARY OF THE INVENTION

[0009] A general aim of the invention is to provide an improved pallet module of the type configured to allow formation of a nested pallet assembly of at least two similar pallet modules.

[0010] More specifically, an aim of the present invention is to provide such a pallet module that ensures formation of a robust pallet assembly, while not compromising ease and speed of assembly and disassembly.

[0011] Yet another aim of the invention is to provide such a pallet module that is constructed and designed to facilitate and optimize shipment as well as warehousing of individual pallet modules and components thereof thanks to more optimal sizes and configurations.

[0012] A further aim of the invention is to provide such a pallet module comprising an improved foot structure.

[0013] Still another aim of the invention is to provide an assortment of pallet modules from which the end user can choose to build a large variety of pallet assemblies.

[0014] Another aim of the invention is to reduce material consumption and increase shipment flexibility and efficiency, especially by reducing waste and providing a reusable solution.

[0015] These aims are achieved thanks to the solutions defined in the claims.

[0016] In accordance with a first aspect of the invention, there is provided a pallet module according to claim 1, namely a pallet module configured to allow formation of a nested pallet assembly of at least two similar pallet modules, the pallet module comprising:

- a main structural body exhibiting a generally quadrilateral peripheral border with first to fourth lateral sides extending between upper and lower sides of the main structural body;
- first and second lateral flanges extending outwardly from the peripheral border of the main structural body, along the first and second lateral sides, the first and second lateral flanges being configured to cooperate with a corresponding side portion of another similar pallet module to form the nested pallet assembly; and

[0017] - a foot structure disposed on the lower side of the main structural body.

[0018] In accordance with this first aspect of the invention, the main structural body exhibits first and second lateral grooves extending inwardly from the peripheral border of the main structural body, along the third and fourth lateral sides, the first and second lateral grooves being each configured to receive the first and second lateral flanges, respectively, of another similar pallet module, so that the first, respectively second lateral flange of said other similar pallet module nests within the first, respectively second lateral groove to form the nested pallet assembly. In addition, the pallet module further comprises first and second toggle latch components arranged in the vicinity of the first and second lateral sides, respectively, and third and fourth toggle latch components arranged in the vicinity of the third and fourth lateral sides, respectively. The first and second toggle latch components are each configured to cooperate and interlock with the third and fourth toggle latch components, respectively, of another similar pallet module of the nested pallet assembly, to form releasable toggle latches allowing the pallet module to be secured to or released from said other similar pallet module.

[0019] According to a preferred embodiment of the invention, each of the first and second lateral flanges exhibits at least one positioning notch formed along an outer edge of the first and second lateral flanges, and each of the first and second lateral grooves exhibits at least one protrusion configured to mate with the at least one positioning notch provided on the first and second lateral flanges of another similar pallet module. By way of preference, a position of each positioning notch along the outer edge of the first and second lateral flanges and a position of each protrusion within the first and second lateral grooves coincide with a position of each of the first to fourth toggle latch components along the first to fourth lateral sides.

[0020] The first and second lateral flanges may in particular be offset sideways with respect to the first and second lateral sides, with the first and second lateral flanges being optionally joined together to form an L-shaped lateral flange.

[0021] By way of preference, the first to fourth toggle latch components are provided on the upper side of the main structural body at least partly within recesses formed below an upper surface of the upper side of the main structural body.

[0022] Advantageously, the first and second toggle latch components are spring-loaded latch elements comprising a moveable latch section that extends outwardly beyond the peripheral border of the main structural body, and the third and fourth toggle latch components are catch elements comprising a catch section configured to cooperate with the moveable latch section of the spring-loaded latch elements of another similar pallet module. In this context, the first and second toggle latch components may in particular be manually-actuatable spring-loaded latch elements further comprising a handle section that is mechanically linked to the moveable latch section to allow manual actuation of the first and second toggle latch components.

[0023] The first and second lateral flanges may be formed integrally with the main structural body, in which case the main structural body and the first and second lateral flanges can advantageously be made of plastic.

[0024] In the aforementioned context, the pallet module may furthermore comprise a plurality of reinforcing elements extending within the main structural body and the first and/or second lateral flanges. Such reinforcing element may in particular be made of a metal, such as aluminium, of a metal alloy, or of a composite material.

[0025] The aforementioned reinforcing elements are preferably longitudinal rod elements extending between upper and lower surfaces of the main structural body and of the first and/or second lateral flanges. Advantageously, a first series of longitudinal rod elements may extend in a first direction and second series of longitudinal rod elements may extend in a second direction distinct from the first direction.

[0026] In accordance with a preferred embodiment of the invention, the pallet module further comprises at least one cover element configured to cover an upper side of the first lateral flange and/or second lateral flange, each cover element having an upper surface that is flush with an upper surface of the upper side of the main structural body. Said at least one cover element comprises at least one toggle latch component configured to cooperate and interlock with a corresponding one of the first and second latch components to form a releasable toggle latch allowing the cover element to be secured to or released from the pallet module.

[0027] In accordance with an embodiment of the invention, the foot structure of the pallet module is configured as a releasable foot structure comprising one or more releasable foot elements that can each be secured to or removed from a corresponding foot-receiving element provided on the lower side of the main structural

body. Each releasable foot element may in particular be connected to the foot-receiving element by means of a spring-loaded locking mechanism configured to allow the releasable foot element to be manually inserted into and automatically interlock with the foot-receiving element without this requiring any tool. This latter feature constitutes another independent aspect of the invention as specified below. This being said, in accordance with another embodiment of the invention, the foot structure could also be designed as a fixed foot structure comprising one or more fixed foot elements made integral with or permanently attached to the main structural body of the pallet module.

[0028] In accordance with a second aspect of the invention, which second aspect is advantageously combinable with the first aspect of the invention as mentioned above, there is provided a pallet module according to independent claim 11, namely a pallet module configured to allow formation of a nested pallet assembly of at least two similar pallet modules, the pallet module comprising:

- a main structural body exhibiting a generally quadrilateral peripheral border with first to fourth lateral sides extending between upper and lower sides of the main structural body;
- a mating system provided on the first to fourth lateral sides of the main structural body configured to allow nesting of the pallet module within a corresponding part of the mating system of another similar pallet module to form the nested pallet assembly;
- a securing system configured to allow the pallet module to be secured to or released from another similar pallet module of the nested pallet assembly; and
- a foot structure disposed on the lower side of the main structural body.

[0029] In accordance with this second aspect of the invention, the foot structure is configured as a releasable foot structure comprising one or more releasable foot elements that can each be secured to or removed from a corresponding foot-receiving element provided on the lower side of the main structural body, and each releasable foot element is connected to the foot-receiving element by means of a spring-loaded locking mechanism configured to allow the releasable foot element to be manually inserted into and automatically interlock with the foot-receiving element without this requiring any tool.

[0030] The aforementioned spring-loaded locking mechanism preferably includes a mounting aperture provided on each foot-receiving element and configured to receive a head portion of each releasable foot element, which head portion is provided with a retaining section configured to cooperate, upon axial insertion of the head portion inside the mounting aperture, with a plurality of spring-loaded retaining elements provided on each foot-receiving element and emerging inside the mounting aperture. A spacing may additionally be provided between each foot-receiving element and each releasable foot element to allow lateral insertion of a tool for the purpose of releasing the releasable foot element from the foot-receiving element.

[0031] In this latter context, each releasable foot element may advantageously be further provided with a lower mounting aperture configured and dimensioned to receive a head portion of another foot element, each releasable foot element being provided with a plurality of spring-loaded retaining elements emerging inside the lower mounting aperture and configured to cooperate with and retain the retaining section of another foot element upon axial insertion of the head portion inside the lower mounting aperture.

[0032] According to a further embodiment of the invention, through-holes are provided in the main structural body and the first and second lateral flanges next to the toggle latch components, which through-holes extend from an upper surface to a lower surface of the main structural body and said first and second lateral flanges.

[0033] Also claimed is an assortment of pallet modules in accordance with the aforementioned invention produced in at least two different sizes, wherein said assortment of pallet modules includes a unit-size pallet module whose main structural body exhibits a unit size and at least one larger-size pallet module whose main structural body exhibits a length corresponding to an integer multiple of a length of the main structural body of the unit-size pallet module, the unit-size pallet module and the at least one larger-size pallet module being combinable with one another.

[0034] In accordance with a preferred embodiment of the assortment of pallet modules, the peripheral border of the main structural body of the unit-size pallet module exhibits a square shape. The length of the main structural body of the unit-size pallet module may in particular be of the order of 150 mm to 300 mm. In this particular context, the length of the main structural body of the at least one larger-size pallet module is at least twice the length of the main structural body of the unit-size pallet module.

[0035] In this latter context, the assortment of pallet modules preferably includes a medium-size pallet module and a large-size pallet module, the peripheral border of the main structural body of the medium-size pallet module exhibiting a rectangular shape having a length equal to twice the length of the main structural body of the unit-size pallet module and a width smaller than the length of the main structural body of the unit-size pallet module, and the peripheral border of the main structural body of the large-size pallet module exhibiting a square shape having a length equal to twice the length of the main structural body of the unit-size pallet module.

[0036] Also claimed is a pallet assembly built of multiple pallet modules according to the invention, which pallet modules are nested within and interlocked with one another.

[0037] Further advantageous embodiments of the invention are discussed below.

BRIEF DESCRIPTION OF THE DRAWINGS

[0038] Other features and advantages of the present invention will appear more clearly from reading the following detailed description of embodiments of the invention which are presented solely by way of non-restrictive examples and illustrated by the attached drawings in which:

Figure 1A is a perspective view of a pallet module, seen from an upper angle, in accordance with a first embodiment of the present invention;
Figure 1B is a perspective view of the pallet module of Figure 1A seen from a lower angle;
Figure 1C is a top view of the pallet module of Figure 1A;
Figure 1D is a bottom view of the pallet module of Figures 1A;
Figure 1E is a side view of the pallet module of Figure 1A as seen from a first side;
Figure 1F is a side view of the pallet module of Figure 1A as seen from a second side;
Figure 1G is a side view of the pallet module of Figure 1A as seen from a third side;
Figure 1H is a side view of the pallet module of Figure 1A as seen from a fourth side;
Figure 2A is a partial perspective view of the pallet module of Figure 1A as seen from a lower angle and which shows one of a plurality of foot elements of a foot structure provided on a lower side of the pallet module in accordance with another aspect of the invention;
Figures 2B and 2C are exploded views of one of the foot elements of Figure 2A shown in isolation;
Figure 3A is a perspective view of a pallet module, seen from an upper angle, in accordance with a second embodiment of the present invention;
Figure 3B is a perspective view of the pallet module of Figure 3A seen from a lower angle;
Figure 3C is a top view of the pallet module of Figure 3A;
Figure 4A is a perspective view of a pallet module, seen from an upper angle, in accordance with a third embodiment of the present invention;
Figure 4B is a perspective view of the pallet module of Figure 4A seen from a lower angle;
Figure 4C is a top view of the pallet module of Figure 4A;
Figure 5A is a perspective view of the pallet module of Figure 1A, seen from an upper angle, which pallet module is further provided with a pair of cover elements in accordance with a further embodiment of the invention;
Figure 5B is a perspective view of the pallet module and cover elements of Figure 5A seen from a lower angle;
Figures 6A and 6B are perspective views of a first one of the cover elements of Figures 5A-5B seen from upper and lower angles;
Figures 7A and 7B are perspective views of the second one of the cover elements of Figures 5A-5B seen from upper and lower angles;
Figure 8 is a perspective view of a releasable toggle latch as used for securing two adjacent pallet modules one to the other in accordance with a preferred embodiment of the invention;
Figure 9A is a schematic top view of a pallet assembly formed by combining multiple pallet modules in accordance with the first embodiment of the present invention;
Figure 9B is another schematic top view of a pallet assembly formed by combining multiple pallet modules in accordance with the second and third embodiments of the present invention;
Figure 10A is a perspective view of a pallet module, seen from an upper angle, in accordance with another embodiment of the present invention;
Figure 10B is a perspective view of the pallet module of Figure 10A seen from a lower angle;
Figure 11A is a perspective view of a pallet module, seen from an upper angle, in accordance with yet another embodiment of the present invention;
Figure 11B is a perspective view of the pallet module of Figure 11B seen from a lower angle;
Figure 12A is a perspective view of a pallet module, seen from an upper angle, in accordance with a further embodiment of the present invention, which pallet module forms part of the same assortment of pallet modules as the pallet module of Figures 11A-B;
Figure 12B is a perspective view of the pallet module of Figure 12A seen from a lower angle;
Figure 13A is a perspective view of a pallet module, seen from an upper angle, in accordance with still another embodiment of the present invention, which pallet module forms part of the same assortment of pallet modules as the pallet modules of Figures 11A-B and Figures 12A-B; and
Figure 13B is a perspective view of the pallet module of Figure 13A seen from a lower angle.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

[0039] The present invention will be described in relation to various illustrative embodiments. It shall be understood that the scope of the invention encompasses all combinations and sub-combinations of the features of the embodiments disclosed herein.

[0040] As described herein, when two or more parts or components are described as being connected, secured or coupled to one another, they can be so connected, secured or coupled directly to each other or through one or more intermediary parts.

[0041] The invention will be described in relation to various embodiments of pallet modules as depicted in Figures 1A-H to 13A-B, which pallet modules are each con-

figured to allow formation of a nested pallet assembly of at least two similar pallet modules as schematically illustrated, by way of illustration, in Figures 9A and 9B. While some features of the invention will be discussed with reference to Figures 1A-H to 2A-C and 5A-B to 8, it shall be appreciated that the relevant considerations apply by analogy to the embodiments shown in Figures 3A-C, 4A-C and 10A-B to 13A-B.

[0042] Figures 1A and 1B are two perspective views, taken from different viewing angles, of a pallet module, designated globally by reference numeral 10, in accordance with a first embodiment of the invention. The same pallet module 10 is shown from the top and bottom in Figures 1C and 1D and from all four sides in Figures 1E to 1H.

[0043] The pallet module 10 (as well as the other embodiments of pallet modules described herein) is configured to allow formation of a nested pallet assembly of at least two similar pallet modules, be it another identical pallet module 10 or e.g. a compatible pallet module 20 or 30 as for instance shown in Figures 3A-C or Figures 4A-C.

[0044] The pallet module 10 comprises a main structural body 100 exhibiting a generally quadrilateral peripheral border 100A with first to fourth lateral sides 101-104 extending between upper and lower sides 100B, 100C of the main structural body 100. The first to fourth lateral sides 101-104 are here numbered in sequence in the counter-clockwise direction when looking at the pallet module 10 from the top (as shown in Figure 1C). The pallet module 10 further comprises a foot structure 90 that is disposed on the lower side 100C of the main structural body 100. The foot structure 90 could be designed as a fixed foot structure comprising one or more fixed foot elements made integral with or permanently attached to the main structural body 100. By way of preference, however, the foot structure 90 is configured as a releasable foot structure comprising one or more releasable foot elements 91 that can each be secured to or removed from a corresponding foot-receiving element 92 provided on the lower side 100C of the main structural body 100.

[0045] In accordance with this first embodiment, the peripheral border 100A here exhibits a square shape with a defined length (and width) L1 as reproduced on Figure 1C. By way of illustration, it will be assumed that the length L1 is of the order of 300 mm, but any other length could be contemplated. From a general perspective, the length of the pallet module of the invention may especially be within a range of the order of 150 mm to 1'200 mm.

[0046] More specifically, the pallet module 10 depicted in Figures 1A-H forms one pallet module of an assortment of pallet modules (including the pallet module 20 of Figures 3A-C and the pallet module 30 of Figures 4A-C) that are combinable together to form a nested pallet assembly. In that regard, the pallet module 10 will also be referred as a "unit-size pallet module", namely a pallet module 10 whose main structural body exhibits a unit size of here L1 x L1, all other pallet modules of the relevant assortment exhibiting a larger size. More precisely, the larger-size pallet modules (e.g. the pallet modules 20 and 30 of Figures 3A-C and Figures 4A-C, respectively) are pallet modules whose main structural body (200, resp. 300) exhibits a length (L2, resp. L3) corresponding to an integer multiple of the length L1 of the main structural body 100 of the unit-size pallet module 10. In that respect, length L1 will also be referred to as "unit length".

[0047] One particular feature of the pallet module 10 of Figures 1A-H, which is likewise reflected on the pallet module 20 of Figures 3A-C and the pallet module 30 of Figures 4A-C, is the presence of first and second lateral flanges 110, 120 extending outwardly from the peripheral border 100A of the main structural body 100 along the first and second lateral sides 101, 102. These first and second lateral flanges 110, 120 form a first part of the mating system that is configured to allow nesting of multiple pallet modules within one another. As this will be appreciated hereafter, the first and second lateral flanges 110, 120 are configured to cooperate with a corresponding side portion of another similar pallet module, namely another part of the relevant mating system.

[0048] As shown in Figures 1A-1H, the main structural body 100 exhibits first and second lateral grooves 130, 140 extending inwardly from the peripheral border 100A of the main structural body 100 along the third and fourth lateral sides 103, 104. These first and second lateral grooves are each configured to receive the first and second lateral flanges, respectively, of another similar pallet module (including e.g. the first and second lateral flanges 110, 120 of another pallet module 10) so that the first, respectively second lateral flange of said other similar pallet module nests within the first, respectively second lateral groove 130, 140, thereby forming a nested pallet assembly.

[0049] As this is visible from the illustrations of Figures 1A-H (as well as Figures 3A-C and 4A-C), the first and second lateral flanges 110, 120 are advantageously offset sideways with respect to the first and second lateral sides 101, 102. This optimizes the available space for nesting pallet modules one within the other, and especially ensures that load can adequately be supported at each corner of the pallet module. In the illustrated example, in view of the fact that the first and second lateral sides 101, 102 are adjacent sides, it will be appreciated that the first and second lateral flanges 110, 120 jointly form an L-shaped lateral flange on the side of the pallet module, which constitutes a highly characteristic feature of this embodiment of the invention. This same feature is also present on the other illustrated embodiments of the pallet modules of Figures 3A-C and 4A-C.

[0050] In addition to the aforementioned mating system 110, 120, 130, 140, the pallet module 10 further comprises a securing system configured to allow the pallet module 10 to be secured to or released from another similar pallet module of the nested pallet assembly. This securing system includes first and second toggle latch

components 51, 52 that are arranged in the vicinity of the first and second lateral sides 101, 102, respectively, and third and fourth toggle latch components 53, 54 that are arranged in the vicinity of the third and fourth lateral sides 103, 104, respectively. The first and second toggle latch components 51, 52 are each configured to cooperate and interlock with the third and fourth toggle latch components 53, 54, respectively, of another similar pallet module of the nested pallet assembly, to form releasable toggle latches 500 (see Figure 8) allowing the pallet module 10 to be secured to or released from the other similar pallet module.

[0051] As shown in Figure 8, the resulting releasable toggle latches 500 typically comprises a spring-loaded latch element with a moveable latch section 510 that extends outwardly to cooperate with a catch element comprising a catch section 550. The spring-loaded latch element is preferably manually actuatable and further comprises a handle section 520 that is mechanically linked to the moveable latch section 510 to allow manual actuation of the latch element. Each releasable toggle latch 500 is thus formed of two connectable or disconnectable sections, one being provided on one pallet module of the pallet assembly, and the other on the other, adjacent pallet module of the pallet assembly.

[0052] By way of preference, the first to fourth toggle latch components 51-54 are provided on the upper side 100B of the main structural body 100, as shown, namely at least partly within recesses 151-154 formed below an upper surface of the upper side 100B of the main structural body 100. The first to fourth toggle latch components 51-54 could alternatively be provided on the lower side 100C of the main structural body 100, but this constitutes a less favourable solution.

[0053] In the illustrated embodiment, the aforementioned spring-loaded latch element is advantageously located on the side where the first, respectively second lateral flange is provided. This provides for some protection of the moveable latch section 510 thanks to the presence of the neighbouring lateral flange. Referring to Figures 1A-H, the first and second toggle latch components 51, 52 thus consist of spring-loaded latch elements whose moveable latch section 510 extends outwardly beyond the peripheral border 100A of the main structural body 100, i.e. beyond the first and second lateral sides 101, 102, respectively. As a consequence, the third and fourth toggle latch components 53, 54 consist of catch elements whose catch section 550 is located entirely with the relevant recesses 153, 154, respectively. As illustrated, a corresponding clearance is formed in all four lateral sides 101 to 104 to allow passage of the relevant portion of the moveable latch section 510, thereby allowing assembly of multiple pallet modules together.

[0054] In accordance with a particularly preferred embodiment, each of the first and second lateral flanges 110, 120 exhibits at least one positioning notch 110A, respectively 120A, formed along an outer edge of the first and second lateral flanges 110, 120. In the illustrations of Figures 1A-H, only one positioning notch 110A, respectively 120A, is formed along the outer edge of the first and second lateral flanges 110, 120. Likewise, each of the first and second lateral grooves 130, 140 exhibits at least one corresponding protrusion 130A, respectively 140A, configured to mate with a corresponding positioning notch provided on the first and second lateral flanges of another similar pallet module.

[0055] In accordance with a particularly preferred variant, as shown, a position of each positioning notch 110A, 120A along the outer edge of the first and second lateral flanges 110, 120 and a position of each protrusion 130A, 140A within the first and second lateral grooves coincide with a position of each of the first to fourth toggle latch components 51-54 along the first to fourth lateral sides. This same principle is reflected on the other pallet modules of the same assortment and guarantees a precise and accurate positioning of the pallet modules one with respect to the other. This further ensures that the mating system 110, 120, 130, 140 ideally supports load applied on the pallet assembly and provides adequate resistance and robustness against shear stress.

[0056] By way of preference, the first and second lateral flanges 110, 120 are formed integrally with the main structural body 100, which ensures structural integrity of the entire pallet module. One could alternatively contemplate to build the pallet module from multiple pallet components that are assembled one with the other.

[0057] An integral structure is however preferred in that the pallet module can be mass-produced, for instance by moulding. In that respect, the main structural body 100 and first and second lateral flanges 110, 120 can especially be made of plastic, which can especially be shaped into the desired configuration by moulding. In that respect, one may appreciate that the main structural body 100 shown in Figures 1A-H is advantageously structured to form ribs and valleys to save weight, while maintaining the structural integrity of the main structural body 100.

[0058] In this latter context especially, it is of interest for structural integrity to additionally provide a plurality of reinforcing element extending within the main structural body and the first and/or second lateral flanges. These reinforcing elements can be made of any suitable material, especially a metal, such as aluminium, a metal alloy or a composite material.

[0059] Reinforcing elements are shown in Figures 1A-H as longitudinal rod elements 161, 162 that extend within the main structural body 100 and the first and second lateral flanges 110, 120, between upper and lower surfaces thereof. More precisely, in the illustrated embodiment, a first series of longitudinal rod elements 161 extends in a first direction (here from the first lateral side 101 to the third lateral side 103 of the main structural body 100, both above and below the location of the first and second lateral flanges 110, 120), while a second series of longitudinal rod elements 162 extends in a second direction distinct from the first direction (here perpendicularly to the first series of rod elements 161, within

the thickness of the first and second lateral flanges 110, 120).

[0060] The reinforcing elements 161, 162 can especially be integrated within the main structural body 100 and the first and second lateral flanges 110, 120, made of plastic, by combined moulding techniques, where the relevant reinforcing elements 161, 162 are prepositioned inside the mould prior to injection of the plastic material to ultimately form a combined metal-plastic structure.

[0061] Figure 2A is a partial perspective view of the pallet module of Figure 1A-H as seen from a lower angle and which shows one of a plurality of foot elements of the foot structure 90 provided on the lower side 100C of the main structural body 100 of the pallet module 10.

[0062] In accordance with a preferred variant of the invention, as illustrated, the foot structure 90 is configured as a releasable foot structure comprising one or more releasable foot elements 91 that can each be secured to or removed from a corresponding foot-receiving element 92 provided on the lower side 100C of the main structural body 100.

[0063] By way of preference, each releasable foot element 91 is connected to the foot-receiving element 92 by means of a spring-loaded locking mechanism (an example of which is shown in greater detail in Figures 2B and 2C) that is configured to allow the releasable foot element 91 to be manually inserted into and automatically interlock with the foot-receiving element 92 without this requiring any tool. This actually forms another aspect of the invention, which, although advantageously combinable with the aforementioned pallet module structure, could be used independently thereof.

[0064] Figures 2B and 2C are exploded views of a particularly advantageous configuration of the releasable foot element 91 and foot-receiving element 92, where the spring-loaded locking mechanism includes a mounting aperture 92A provided on each foot-receiving element 92 (see Figure 2C) and configured to receive a head portion 91A of each releasable foot element 91. This head portion 91A is provided with a retaining section 91B, namely a retaining groove forming a neck section on the head portion 91A, which retaining section 91B is configured to cooperate, upon axial insertion of the head portion 91A inside the mounting aperture 92A, with a plurality of spring-loaded retaining elements 95 provided on each foot-receiving element 92 and emerging inside the mounting aperture 92A. In the present example, four such retaining elements 95 are distributed about the mounting aperture 92A and only part thereof is accordingly visible in Figure 2C.

[0065] The spring-loaded retaining elements 95 can be simple elongated elements that are mounted inside radial holes formed in the foot-receiving element 92 and that are urged towards the interior of the mounting aperture 92A by means of springs.

[0066] Each releasable foot element can further be provided with a lower mounting aperture 91C configured and dimensioned to receive a head portion 91A of another foot element 91, each releasable foot element 91 being provided with a plurality of spring-loaded retaining elements 95* (similar to the spring-loaded retaining elements 95 provided in the foot-receiving element 92) emerging inside the lower mounting aperture 91C and configured to cooperate with and retain the retaining section 91B of another foot element 91 upon axial insertion of the head portion 91A inside the lower mounting aperture 91C. In this way, multiple foot elements 91 can be assembled together to form component assemblies that are easier and more convenient to handle, especially for shipment purposes. In the illustrated example, only two spring-loaded retaining elements 95* are provided, which is sufficient for the contemplated purpose. The force exerted by these spring-loaded retaining elements 95* can furthermore be selected to facilitate purely manual release of the foot elements 91 one from another.

[0067] Also shown in Figures 2A-C is a spacing 92C provided between each foot-receiving element 92 and each releasable foot element 91. This spacing 92C is configured to allow lateral insertion of a tool, such as a crowbar or screwdriver, between the foot-receiving element 92 and the releasable foot element 91. Using the tool as a lever, the releasable foot element 91 can be easily released from the foot-receiving element 92.

[0068] Also visible in Figures 2B-C is a head portion 92B of the foot-receiving element 92. This head portion 92B is used for the purpose of securing the foot-receiving element 92 to the lower side 100C of the main structural body 100. In a manner similar to the aforementioned reinforcing elements 161, 162, the foot-receiving elements 92 - or more precisely the head portion 92B thereof - can be integrated to the lower side 100C of the main structural body 100, made of plastic, by combined moulding techniques.

[0069] Figures 3A-C are two perspective views, taken from different viewing angles, and a top view of a pallet module, designated globally by reference numeral 20, in accordance with a second embodiment of the invention, and which forms part of a same assortment of pallet modules as the pallet module 10 of Figures 1A-H. The pallet module 20 will also be referred as a "large-size pallet module".

[0070] Figures 4A and 4B are two perspective views, taken from different viewing angles, and a top view of a pallet module, designated globally by reference numeral 30, in accordance with a third embodiment of the invention, and which likewise forms part of a same assortment of pallet modules as the pallet module 10 of Figures 1A-H and the pallet module 20 of Figures 3A-C. The pallet module 30 will also be referred as a "medium-size pallet module".

[0071] The pallet modules 20 and 30 share a substantial number of common features with the pallet module 10, including:

- a main structural body 200, resp. 300, exhibiting a generally quadrilateral peripheral border 200A, resp.

300A with first to fourth lateral sides 201-204, resp. 301-304, extending between upper and lower sides 200B, 200C, resp. 300B, 300C, of the main structural body 200, resp. 300;

- first and second lateral flanges 210, 220, resp. 310, 320, extending outwardly from the peripheral border 200A, resp. 300A, of the main structural body 200, resp. 300, along the first and second lateral sides 201, 202, resp. 301, 302;
- first and second lateral grooves 230, 240, resp. 330, 340, extending inwardly from the peripheral border 200A, resp. 300A, of the main structural body 200, resp. 300, along the third and fourth lateral sides 203, 204, resp. 303, 304;
- a foot structure 90 disposed on the lower side 200C, resp. 300C, of the main structural body 200, resp. 300;
- first and second toggle latch components 51, 52 arranged in the vicinity of the first and second lateral sides 201, 202, resp. 301, 302; and
- third and fourth toggle latch components 53, 54 arranged in the vicinity of the third and fourth lateral sides 203, 204, resp. 303, 304.

[0072] The first to fourth toggle latch components 51-54 are likewise provided on the upper side 200B, resp. 300B, of the main structural body 200, resp. 300, at least partly within corresponding recesses 251-254, resp. 351-354, formed below the upper surface of the upper side 200B, resp. 300B, of the main structural body 200, resp. 300.

[0073] One difference between the pallet module 20 of Figures 3A-C and the pallet module 10 of Figures 1A-H resides in the dimensions of the pallet module 20, or more exactly the dimensions of the main structural body 200. In accordance with this second embodiment, the peripheral border 200A here exhibits a square shape with a defined length (and width) L2 as reproduced on Figure 3C, which is twice the unit length L1 of the unit-size pallet module 10 of Figures 1A-H, i.e. of the order of 600 mm in the illustrated example, hence the reason why this pallet module 20 is being referred to as the large-size pallet module.

[0074] Similarly, one difference between the pallet module 30 of Figures 4A-C and the pallet module 10 of Figures 1A-H resides in the dimensions of the pallet module 30, or more exactly the dimensions of the main structural body 300. In accordance with this third embodiment, the peripheral border 300A here exhibits a rectangular shape with a defined length L3 and defined width W3 as reproduced on Figure 4C. The length L3 is likewise twice the unit length L1 of the unit-size pallet module 10 of Figures 1A-H, i.e. of the order of 600 mm in the illustrated example, but the width W3, in the illustrated example, is of the order of 400 mm, hence the reason why this pallet module 30 is being referred to as the medium-size pallet module.

[0075] The overall size of the pallet module 30 is specifically chosen in the illustrated example to correspond to exactly a quarter of the dimensions of a standard Euro-pallet which has a length of 1'200 mm and a width of 800 mm. In other words, assembling four medium-size pallet modules 30 in a square would lead to a pallet assembly exhibiting substantially the size of a standard Euro-pallet. Other dimensions could however be contemplated.

[0076] As a result of the aforementioned choices of dimensions, and in order to ensure compatibility with e. g. the pallet module 10 of Figures 1A-H, the number of toggle latch components 51-54 on each side of the pallet module 20 is doubled, whereas only the number of second and fourth toggle latch components 52, 54 is doubled in the case of the pallet module 30. By the same token, each of the first and second lateral flanges 210, 220 and each of the first and second lateral grooves 230, 240 are provided with a pair of positioning notches 210A, 220A and a pair of protrusions 230A, 240A, respectively, whereas only the second lateral flange 320 and the second lateral groove 340 are each provided with a pair of positioning notches 320A and protrusions 340A.

[0077] In the example in Figures 3A-C, the position of the second and fourth toggle latch components 52 and 54 along the second and fourth lateral sides 202, 204 (and of the positioning notches 220A and protrusions 240A) is compatible with the position of the toggle latch components 51-54 (and of the position of the relevant notches and protrusions) along the lateral sides 101-104 of the pallet module 10 or of the toggle latch components 52, 54 along the lateral sides 302, 304 of the pallet module 30. In other words, two pallet modules 10 or one pallet module 30 could be assembled to either one or both of the second and fourth lateral sides 202, 204 of the pallet module 20.

[0078] By contrast, the position of the first and third toggle latch components 51 and 53 along the first and third lateral sides 201, 203 (and of the positioning notches 210A and protrusions 230A) is different, meaning that the pallet module 20 can only be coupled via the first lateral side 201 or the third lateral side 203 to a corresponding lateral side of another pallet module 20 or to a similar pallet module exhibiting the same configuration.

[0079] The pallet module 20 could however be designed to ensure that all toggle latch components 51-54, positioning notches 210A, 220A and protrusions 230A, 240A are positioned in a symmetric manner and ensure compatibility of engagement on all sides with the other pallet modules.

[0080] As far as the toggle latch components 51-54 are concerned, these are identical to the toggle latch components 51-54 used in the first embodiment. In other words, the first and second toggle latch components 51, 52 shown in Figures 3A-C and 4A-C are likewise spring-loaded latch elements comprising a moveable latch section 510 (linked to a handle section 520) that extends outwardly beyond the peripheral border 200A, resp. 300A, of the main structural body 200, resp. 300, while the third and fourth toggle latch components 53, 54 are

catch elements comprising a catch section 550 configured to cooperate with the moveable latch section 510 of the spring-loaded latch elements of another similar pallet module.

[0081] Other than that, substantially the same considerations as set forth in respect of the first embodiment of Figures 1A-H apply to the pallet modules 20 and 30.

[0082] For instance, longitudinal rod elements 261, 262, resp. 361, 362, acting as reinforcing elements are likewise provided within the main structural body 200, resp. 300, and within the first and second lateral flanges 210, 220, resp. 310, 320.

[0083] In the same way, the foot structure 90 of pallet modules 20 and 30 can be strictly identical to the foot structure 90 discussed in relation to the first embodiment and Figures 2A-C, meaning that the releasable foot elements 91 are perfectly interchangeable between the pallet modules 10, 20 and 30.

[0084] It will therefore be appreciated that the present invention provides for unprecedented flexibility in that a large variety and sizes of pallet assemblies can be created to meet various requirements. Furthermore, this modularity is not made to the detriment of the ease and speed of assembly and disassembly, or of the robustness. This extensive modularity furthermore facilitates shipment of the relevant pallet modules and components, optimizes space usage, and increases transport efficiency as a result. The advantages of the invention are multiple and include in particular:

- multiple pallet module sizes, which reduces material waste and leads to a more efficient solution for shipment purposes as multiple pallet assemblies of varying sizes can be built as a result, which pallet assemblies best fit the transport purpose and especially allow to reduce wasted space between palleted goods or equipment;
- improved stackability of the pallet modules when empty/unused, which optimizes shipment as well as warehousing of individual pallet modules;
- ease and speed of assembly and disassembly of the pallet modules;
- optimized height of the pallet modules, which allows for a further reduction of the volume when shipping or warehousing individual pallet modules; and
- high robustness and reliability, which leads to an increased life cycle and the ability to reuse the pallet modules for multiple transport operations.

[0085] Figures 10A-B are two perspective views, taken from different viewing angles, of a pallet module, designated globally by reference numeral 40, in accordance with another embodiment of the invention, and which forms part of another assortment of pallet modules. The pallet module 40 will, like the pallet module 10 of Figures 1A-H, be referred as a "unit-size pallet module".

[0086] The pallet module 40 shares a substantial number of common features with the pallet modules 10, 20 and 30, including:

- a main structural body 400 exhibiting a generally quadrilateral peripheral border 400A with first to fourth lateral sides 401-404 extending between upper and lower sides 400B, 400C of the main structural body 400;
- first and second lateral flanges 410, 420 extending outwardly from the peripheral border 400A of the main structural body 400 along the first and second lateral sides 401, 402;
- first and second lateral grooves 430, 440 extending inwardly from the peripheral border 400A of the main structural body 400 along the third and fourth lateral sides 403, 404;
- a foot structure 90* disposed on the lower side 400C of the main structural body 400;
- first and second toggle latch components 51, 52 arranged in the vicinity of the first and second lateral sides 401, 402; and
- third and fourth toggle latch components 53, 54 arranged in the vicinity of the third and fourth lateral sides 403, 404.

[0087] In a manner similar to the unit-size pallet module 10, the main structural body 400 of the unit-size pallet module 40 preferably exhibits a square shape, and all larger-size pallet modules of the same assortment (not shown) exhibit similar configurations allowing pallet modules to be combinable with one another. By way of illustration, the unit length (L1) of the unit-size pallet module 40 is here of the order of 192 mm.

[0088] The first to fourth toggle latch components 51-54 are likewise provided on the upper side 400B of the main structural body 400, at least partly within corresponding recesses 451-454 formed below the upper surface of the upper side 400B of the main structural body 400.

[0089] One difference between the pallet module 40 of Figures 10A-B and the pallet modules 10, 20, 30 of Figures 1A-H, 3A-C and 4A-C resides in the configuration of the first and second lateral flanges 410, 420 and first and second lateral grooves 430, 440, which only extend along a portion of the relevant lateral sides 401-404. It may furthermore be appreciated that each lateral flange 410, 420 is provided with a pair of positioning notches 410A, resp. 420A, and that each lateral groove 430, 440 is likewise provided with a pair of protrusions 430A, 440A, the function of which remains the same as previously described.

[0090] One further difference resides in the configuration of the foot structure 90*, which consists in this example of a fixed foot structure provided on the lower side 400C of the main structural body 400 and comprising a foot element 91* that is made integral with the main structural body 400. Advantageously, the foot element 91* exhibits a conical shape, as shown, and the main structural body 400 is structured to exhibit a corresponding

depression on the upper side 400B allowing stacking of multiple pallet modules 40 one on top of the other, which reduces space consumption when stacked.

[0091] The aforementioned pallet module structures and sizes are illustrative of possible embodiments of the invention. In accordance with another embodiment of the invention, one could contemplate that the main structural body of each of the larger-size pallet modules has a size corresponding to an integer multiple of the unit size of the unit-size pallet module.

[0092] In particular, the unit-size pallet module could exhibit a square shape of dimensions L1 x L1 (like the pallet module 10 of Figures 1A-H or the pallet module 40 of Figures 10A-B) and the peripheral border of the main structural body of each one of the larger-size pallet modules could exhibit a square shape of dimensions n*L1 x n*L1, where n is an integer greater than or equal to 2. Even more preferably, the larger-size pallet modules could exhibit a square shape of dimension 2^n*L1 x 2^n*L1. Figures 11A-B to 13A-B are illustrative of an assortment of pallet modules following this principle. In this context, optimal sizes include especially sizes deriving from a unit length L1 ranging from 150 mm to 300 mm, and in particular a unit length of 180-192 mm, 239-256 mm or 272-288 mm, which constitute particularly preferred dimensions.

[0093] Figures 11A-B are two perspective views, taken from different viewing angles, of a pallet module, designated globally by reference numeral 10*, in accordance with yet another embodiment of the invention, and which forms part of a further assortment of pallet modules. The pallet module 10* will, like the pallet module 10 of Figures 1A-H and the pallet module 40 of Figures 10A-B, be referred as a "unit-size pallet module".

[0094] Figures 12A-B are two perspective views, taken from different viewing angles, of a pallet module, designated globally by reference numeral 20*, in accordance with an embodiment of the invention, and which forms part of the same assortment of pallet modules as the pallet module 10* of Figures 11A-B. The pallet module 20* will also be referred as a "medium-size pallet module".

[0095] Figures 13A-B are two perspective views, taken from different viewing angles, of a pallet module, designated globally by reference numeral 30*, in accordance with an embodiment of the invention, and which likewise forms part of the same assortment of pallet modules as the pallet module 10* of Figures 11A-B and the pallet module 20* of Figures 12A-B. The pallet module 30* will also be referred as a "large-size pallet module".

[0096] The pallet modules 10*, 20* and 30* share a substantial number of common features, including:

- a main structural body 100*, 200*, resp. 300*, exhibiting a generally quadrilateral peripheral border 100A*, 200A*, resp. 300A* with first to fourth lateral sides 101*-104*, 201*-204*, resp. 301*-304*, extending between upper and lower sides 100B*, 100C*, 200B*, 200C*, resp. 300B*, 300C*, of the main structural body 100*, 200*, resp. 300*;
- first and second lateral flanges 110*, 120*, 210*, 220*, resp. 310*, 320*, extending outwardly from the peripheral border 100A*, 200A*, resp. 300A*, of the main structural body 100*, 200*, resp. 300*, along the first and second lateral sides 101*, 102*, 201*, 202*, resp. 301*, 302*;
- first and second lateral grooves 130*, 140*, 230*, 240*, resp. 330*, 340*, extending inwardly from the peripheral border 100A*, 200A*, resp. 300A*, of the main structural body 100*, 200*, resp. 300*, along the third and fourth lateral sides 103*, 104*, 203*, 204*, resp. 303*, 304*;
- a foot structure 90* disposed on the lower side 100C*, 200C*, resp. 300C*, of the main structural body 100*, 200*, resp. 300*;
- first and second toggle latch components 51, 52 arranged in the vicinity of the first and second lateral sides 101*, 102*, 201*, 202*, resp. 301*, 302*; and
- third and fourth toggle latch components 53, 54 arranged in the vicinity of the third and fourth lateral sides 103*, 104*, 203*, 204*, resp. 303*, 304*.

[0097] The first to fourth toggle latch components 51-54 are likewise provided on the upper side 100B*, 200B*, resp. 300B*, of the main structural body 100*, 200*, resp. 300*, at least partly within corresponding recesses 151*-154*, 251*-254*, resp. 351*-354*, formed below the upper surface of the upper side 100B*, 200B*, resp. 300B*, of the main structural body 100*, 200*, resp. 300*.

[0098] The main structural bodies 100*, 200*, 300* of the unit-size pallet module 10*, the medium-size pallet module 20* and the large-size pallet module 30*, respectively, each exhibit a square shape. The length of the main structural body 200* of the medium-size pallet module 20* is here twice the unit length (L1), while the length of the main structural body 300* of the large-size pallet module 30* is four times the unit length (L1). By way of illustration, the unit length (L1) of the unit-size pallet module 10* is of the order of 287,5 mm, meaning that the length of the medium-size pallet module 20* and of the large-size pallet module 30* is of 575 mm and 1’150 mm, respectively. Other dimensions could once again be contemplated, without departing from the scope of the invention as claimed. The number of toggle latch components 51-54 along each side increases as a function of the increase in dimensions of the pallet module, namely from one per side for the unit-size pallet module 10*, to two per side for the medium-size pallet module 20*, and four per side for the large-size pallet module 30*.

[0099] In a manner similar to pallet module 40 of Figures 10A-B, the foot structure 90* consists in each case of a fixed foot structure comprising one or more foot elements 91* that are made integral with the main structural body 100*, 200*, resp. 300*. Advantageously, the main

structural bodies 100*, 200*, resp. 300* are likewise structured to exhibit one or more corresponding depressions on the upper side 100B*, 200B*, resp. 300B* allowing stacking of multiple pallet modules one on top of the other.

[0100] In accordance with another variant of the invention, which is reflected on all illustrated embodiments shown in Figures 1A-H, 3A-C, 4A-C, 10A-B, 11A-B, 12A-B and 13A-B, through-holes 190 could be provided in the main structural body 100, 200, 300, 400, 100*, 200* resp. 300* and the first and second lateral flanges 110, 120, 210, 220, 310, 320, 410, 420, 110*, 120*, 210*, 220* resp. 310*, 320*, next to the toggle latch components 51-54, which through-holes 190 extend from an upper surface to a lower surface of the main structural body and the first and second lateral flanges. Figures 1A-H, 3A-C, 4A-C, 11A-B, 12A-B and 13A-B actually show the provision of a pair of such through-holes 190 next to each of the toggle latch components 51-54, while Figures 10A-B show only one such through-hole 190 next to each of toggle latch component 51-54. These through-holes 190 are advantageous in that they can be exploited for the purpose of passing ropes, straps or like securing bands to secure a load on the relevant pallet assembly. These through-holes 190 can furthermore be used to mount vertical posts on the pallet assembly to support e.g. side walls or barriers.

[0101] Figures 5A-B to 7A-B illustrate a further refinement of the invention shown in the particular context of the pallet module 10, but that is applicable by analogy to any other pallet module, including the pallet modules 20 and 30 of Figures 3A-C and 4A-C, the pallet module 40 of Figures 10A-B, and the pallet modules 10*, 20* and 30* of Figures 11A-B to 13A-B.

[0102] Figures 5A-B show the pallet module 10 of Figures 1A-H additionally provided with a pair of cover elements 170, 180 configured to cover an upper side of the first and second lateral flanges 110, 120, each cover element 170, 180 having an upper surface that is flush with an upper surface of the upper side 100B of the main structural body 100 of the pallet module 10. Each cover element 170, 180 is separately shown in Figures 6A-B and 7A-B, respectively.

[0103] While two cover elements 170, 180 are shown in Figures 5A-B, one could obviously contemplate to use a single L-shaped cover element to cover both the first and second lateral flanges 110, 120.

[0104] It shall also be appreciated that each cover element may also cover part of the first or second lateral flanges of another pallet module of the nested pallet assembly as for instance disclosed by way of illustration in Figures 9A and 9B.

[0105] Irrespective of the above, each cover element comprises at least one toggle latch component 71, resp. 81, configured to cooperate and interlock with a corresponding one of the first and second latch components 51, 52 of the pallet module 10 to form a releasable toggle latch 500 allowing the cover element to be secured to or released from the pallet module 10. In the illustrated example, each toggle latch component 71, 81 consists of a catch element comprising a catch section 550, identical to that of the third and fourth toggle latch components 53, 54, which catch element is located within a corresponding recess 171, resp. 181, of the cover element.

[0106] Also visible in Figures 5A-B to 7A-B is an extension 170A, resp. 180A, provided on the underside of each cover element 170, 180 to fill the gap of the positioning notches 110A, 120A formed along the outer edge of the first and second lateral flanges 110, 120.

[0107] Figures 9A and 9B are two schematic top views of a pallet assembly formed by combining multiple pallet modules in accordance with the present invention.

[0108] More precisely, Figure 9A shows a pallet assembly 1000 formed of nine unit-size pallet modules 10 that are assembled together to form a square-shaped pallet assembly. In this illustrative example, two cover elements 170' and 180' are located on the portions of the pallet assembly 1000 where the first and second lateral flanges 110, 120 of pallet modules 10 would otherwise be exposed.

[0109] Figure 9B shows another pallet assembly 1000* formed of four pallet modules, namely two large-size pallet modules 20 and two medium-size pallet modules 30. In a manner similar to the pallet assembly 1000 of Figure 9A, two cover elements 170* and 180* are located on the portions of the pallet assembly 1000* where the first and second lateral flanges 210, 220, 310, 320 of pallet modules 20, 30 would otherwise be exposed.

[0110] Various modifications and/or improvements may be made to the above-described embodiments without departing from the scope of the invention as defined by the annexed claims. For instance, while the illustrated embodiments show pallet modules where the first and second flanges and the first and second lateral grooves are contiguous, the first and second lateral flanges and the first and second lateral grooves could alternatively be provided on opposite lateral sides of the main structural body of the pallet module. In that respect, the expressions "first lateral side", "second lateral side", "third lateral side" and "fourth lateral side" shall not be construed as designating any particular sequence of sides, but rather any of the four lateral sides forming the quadrilateral peripheral border of the main structural body of the pallet module.

[0111] In addition, it will be understood that each pallet module may comprise a multiplicity of lateral flanges arranged in different levels and a corresponding multiplicity of lateral grooves configured to mate with the multiplicity of a lateral flanges of another similar pallet module.

[0112] Furthermore, as already mentioned hereabove, the foot structure could be designed as a releasable foot structure or as a fixed foot structure comprising one or more fixed foot elements that are made integral with the main structural body of the pallet module or that are permanently attached to the main structural body.

[0113] It is also to be appreciated that the invention is

not limited to assortments of pallet modules including only a unit-size pallet module, a medium-size pallet module and a large-size pallet module.

LIST OF REFERENCE NUMERALS AND SIGNS USED THEREIN

[0114]

10	(unit-size) pallet module (first assortment of pallet modules)
100	main structural body of pallet module 10
100A	generally quadrilateral peripheral border of main structural body 100
100B	upper side of main structural body 100
100C	lower side of main structural body 100
101	first lateral side of main structural body 100
102	second lateral side of main structural body 100
103	third lateral side of main structural body 100
104	fourth lateral side of main structural body 100
110	first lateral flange extending outwardly from peripheral border 100A of main structural body 100, along first lateral side 101
110A	positioning notch formed along an outer edge of first lateral flange 110
120	second lateral flange extending outwardly from peripheral border 100A of main structural body 100, along second lateral side 102
120A	positioning notch formed along an outer edge of second lateral flange 120
130	first lateral groove extending inwardly from peripheral border 100A of main structural body 100, along third lateral side 103
130A	protrusion formed within first lateral groove 130
140	second lateral groove extending inwardly from peripheral border 100A of main structural body 100, along fourth lateral side 104
140A	protrusion formed within second lateral groove 140
151	recess accommodating first toggle latch component 51
152	recess accommodating second toggle latch component 52
153	recess accommodating third toggle latch component 53
154	recess accommodating third toggle latch component 54
161	reinforcing elements extending within main structural body 100 / first series of longitudinal rod elements
162	reinforcing elements extending within main structural body 100 and first and second lateral flanges 110, 120 / second series of longitudinal rod elements
20	(large-size) pallet module (first assortment of pallet modules)
200	main structural body of pallet module 20
200A	generally quadrilateral peripheral border of main structural body 200
200B	upper side of main structural body 200
200C	lower side of main structural body 200
201	first lateral side of main structural body 200
202	second lateral side of main structural body 200
203	third lateral side of main structural body 200
204	fourth lateral side of main structural body 200
210	first lateral flange extending outwardly from peripheral border 200A of main structural body 200, along first lateral side 201
210A	positioning notch formed along an outer edge of first lateral flange 210
220	second lateral flange extending outwardly from peripheral border 200A of main structural body 200, along second lateral side 202
220A	positioning notch formed along an outer edge of second lateral flange 220
230	first lateral groove extending inwardly from peripheral border 200A of main structural body 200, along third lateral side 203
230A	protrusion formed within first lateral groove 230
240	second lateral groove extending inwardly from peripheral border 200A of main structural body 200, along fourth lateral side 204
240A	protrusion formed within second lateral groove 240
251	recess accommodating first toggle latch component 51
252	recess accommodating second toggle latch component 52
253	recess accommodating third toggle latch component 53
254	recess accommodating third toggle latch component 54
261	reinforcing elements extending within main structural body 200 / first series of longitudinal rod elements
262	reinforcing elements extending within main structural body 200 and first and second lateral flanges 210, 220 / second series of longitudinal rod elements
30	(medium-size) pallet module (first assortment of pallet modules)
300	main structural body of pallet module 30
300A	generally quadrilateral peripheral border of main structural body 300
300B	upper side of main structural body 300
300C	lower side of main structural body 300
301	first lateral side of main structural body 300
302	second lateral side of main structural body 300
303	third lateral side of main structural body 300
304	fourth lateral side of main structural body 300
310	first lateral flange extending outwardly from peripheral border 300A of main structural body 300, along first lateral side 301
310A	positioning notch formed along an outer edge of first lateral flange 310
320	second lateral flange extending outwardly from

	peripheral border 300A of main structural body 300, along second lateral side 302
320A	positioning notch formed along an outer edge of second lateral flange 320
330	first lateral groove extending inwardly from peripheral border 300A of main structural body 300, along third lateral side 303
330A	protrusion formed within first lateral groove 330
340	second lateral groove extending inwardly from peripheral border 300A of main structural body 300, along fourth lateral side 304
340A	protrusion formed within second lateral groove 340
351	recess accommodating first toggle latch component 51
352	recess accommodating second toggle latch component 52
353	recess accommodating third toggle latch component 53
354	recess accommodating third toggle latch component 54
361	reinforcing elements extending within main structural body 300 / first series of longitudinal rod elements
362	reinforcing elements extending within main structural body 300 and first and second lateral flanges 310, 320 / second series of longitudinal rod elements
40	(unit-size) pallet module (second assortment of pallet modules)
400	main structural body of pallet module 40
400A	generally quadrilateral peripheral border of main structural body 400
400B	upper side of main structural body 400
400C	lower side of main structural body 400
401	first lateral side of main structural body 400
402	second lateral side of main structural body 400
403	third lateral side of main structural body 400
404	fourth lateral side of main structural body 400
410	first lateral flange extending outwardly from peripheral border 400A of main structural body 400, along portion of first lateral side 401
410A	positioning notches formed along an outer edge of first lateral flange 410
420	second lateral flange extending outwardly from peripheral border 400A of main structural body 400, along portion of second lateral side 402
420A	positioning notches formed along an outer edge of second lateral flange 420
430	first lateral groove extending inwardly from peripheral border 400A of main structural body 400, along portion of third lateral side 403
430A	protrusions formed within first lateral groove 430
440	second lateral groove extending inwardly from peripheral border 400A of main structural body 400, along fourth lateral side 403
440A	protrusions formed within second lateral groove 440
451	recess accommodating first toggle latch component 51
452	recess accommodating second toggle latch component 52
453	recess accommodating third toggle latch component 53
454	recess accommodating third toggle latch component 54
461	reinforcing element (longitudinal rod) extending within main structural body 400
462	reinforcing elements (longitudinal rods) extending within main structural body 400 and second lateral flange 420
10*	(unit-size) pallet module (third assortment of pallet modules)
100*	main structural body of pallet module 10*
100A*	generally quadrilateral peripheral border of main structural body 100*
100B*	upper side of main structural body 100*
100C*	lower side of main structural body 100*
101*	first lateral side of main structural body 100*
102*	second lateral side of main structural body 100*
103*	third lateral side of main structural body 100*
104*	fourth lateral side of main structural body 100*
110*	first lateral flange extending outwardly from peripheral border 100A* of main structural body 100*, along first lateral side 101*
110A*	positioning notch formed along an outer edge of first lateral flange 110*
120*	second lateral flange extending outwardly from peripheral border 100A* of main structural body 100*, along second lateral side 102*
120A*	positioning notch formed along an outer edge of second lateral flange 120*
130*	first lateral groove extending inwardly from peripheral border 100A* of main structural body 100*, along third lateral side 103*
130A*	protrusion formed within first lateral groove 130*
140*	second lateral groove extending inwardly from peripheral border 100A* of main structural body 100*, along fourth lateral side 104*
140A*	protrusion formed within second lateral groove 140*
151*	recess accommodating first toggle latch component 51
152*	recess accommodating second toggle latch component 52
153*	recess accommodating third toggle latch component 53
154*	recess accommodating third toggle latch component 54
161*	reinforcing elements (longitudinal rods) extending within main structural body 100* and first lateral flange 110*
162*	reinforcing elements (longitudinal rods) ex-

	tending within main structural body 100*
20*	(medium-size) pallet module (third assortment of pallet modules)
200*	main structural body of pallet module 20*
200A*	generally quadrilateral peripheral border of main structural body 200*
200B*	upper side of main structural body 200*
200C*	lower side of main structural body 200*
201*	first lateral side of main structural body 200*
202*	second lateral side of main structural body 200*
203*	third lateral side of main structural body 200*
204*	fourth lateral side of main structural body 200*
210*	first lateral flange extending outwardly from peripheral border 200A* of main structural body 200*, along first lateral side 201*
210A*	positioning notch formed along an outer edge of first lateral flange 210*
220*	second lateral flange extending outwardly from peripheral border 200A* of main structural body 200*, along second lateral side 202*
220A*	positioning notch formed along an outer edge of second lateral flange 220*
230*	first lateral groove extending inwardly from peripheral border 200A* of main structural body 200*, along third lateral side 203*
230A*	protrusion formed within first lateral groove 230*
240*	second lateral groove extending inwardly from peripheral border 200A* of main structural body 200*, along fourth lateral side 204*
240A*	protrusion formed within second lateral groove 240*
251*	recess accommodating first toggle latch component 51
252*	recess accommodating second toggle latch component 52
253*	recess accommodating third toggle latch component 53
254*	recess accommodating third toggle latch component 54
261*	reinforcing elements (longitudinal rods) extending within main structural body 200* and first lateral flange 210*
262*	reinforcing elements (longitudinal rods) extending within main structural body 200*
30*	(large-size) pallet module (third assortment of pallet modules)
300*	main structural body of pallet module 30*
300A*	generally quadrilateral peripheral border of main structural body 300*
300B*	upper side of main structural body 300*
300C*	lower side of main structural body 300*
301*	first lateral side of main structural body 300*
302*	second lateral side of main structural body 300*
303*	third lateral side of main structural body 300*
304*	fourth lateral side of main structural body 300*
310A*	first lateral flange extending outwardly from peripheral border 300A* of main structural body 300*, along first lateral side 301*
310A*	positioning notch formed along an outer edge of first lateral flange 310A*
320*	second lateral flange extending outwardly from peripheral border 300A* of main structural body 300*, along second lateral side 302*
320A*	positioning notch formed along an outer edge of second lateral flange 320*
330*	first lateral groove extending inwardly from peripheral border 300A* of main structural body 300*, along third lateral side 303*
330A*	protrusion formed within first lateral groove 330*
340*	second lateral groove extending inwardly from peripheral border 300A* of main structural body 300*, along fourth lateral side 304*
340A*	protrusion formed within second lateral groove 340*
351*	recess accommodating first toggle latch component 51
352*	recess accommodating second toggle latch component 52
353*	recess accommodating third toggle latch component 53
354*	recess accommodating third toggle latch component 54
361*	reinforcing elements (longitudinal rods) extending within main structural body 300* and first lateral flange 310A*
362*	reinforcing elements (longitudinal rods) extending within main structural body 300*
51	first toggle latch component(s) arranged in the vicinity of the first lateral side 101, 201, 301, 401, 101*, 201* resp. 301* / spring-loaded latch element(s)
52	second toggle latch component(s) arranged in the vicinity of the second lateral side 102, 202, 302, 402, 102*, 202* resp. 302* / spring-loaded latch element(s)
53	third toggle latch component(s) arranged in the vicinity of the third lateral side 103, 203, 303, 403, 103*, 203* resp. 303* / catch element(s)
54	fourth toggle latch component(s) arranged in the vicinity of the fourth lateral side 104, 204, 304, 404, 104*, 204* resp. 304* / catch element(s)
170	cover element configured to cover upper side of first lateral flange
170A	extension of cover element 170 configured to fill the gap of the positioning notch on the first lateral flange
171	recess formed in cover element 170 to accommodate toggle latch component 71
180	cover element configured to cover upper side of second lateral flange
180A	extension of cover element 180 configured to

	fill the gap of the positioning notch on the second lateral flange
181	recess formed in cover element 180 to accommodate toggle latch component 81
170'	cover element configured to cover upper side of first lateral flange
180'	cover element configured to cover upper side of second lateral flange
170*	cover element configured to cover upper side of first lateral flange
180*	cover element configured to cover upper side of second lateral flange
71	toggle latch component / catch element(s) provided on cover element 170, 170', resp. 170*
81	toggle latch component / catch element(s) provided on cover element 180, 180', resp. 180*
500	releasable toggle latch
510	moveable latch section of spring-loaded latch element 51, resp. 52
520	handle section mechanically linked to moveable latch section 510
550	catch section of catch element 53, 54, 71, resp. 81
90	foot structure (releasable)
91	releasable foot elements
91A	head portion of releasable foot element 91 dimensioned and configured to be received in mounting aperture 92A of foot-receiving element 92 or in lower mounting aperture 91C of another releasable foot element 91
91B	retaining section 91B of head portion 91A configured to cooperate with spring-loaded retaining elements 95 or 95*
91C	lower mounting aperture provided in lower portion of releasable foot element 91 / dimensioned to receive head portion 91A of another releasable foot element 91
92	foot-receiving elements provided on lower side 100C, 200C, resp. 300C of main structural body 100, 200, resp. 300
92A	mounting aperture provided in foot-receiving element 92 / dimensioned to receive head portion 91A of releasable foot element 91
92B	head portion of foot-receiving element 92 for attachment to lower side 100C, 200C, resp. 300C of main structural body 100, 200, resp. 300
95	spring-loaded retaining elements provided on foot-receiving element 92 and emerging inside mounting aperture 92A
95*	spring-loaded retaining elements provided on lower portion of releasable foot element 91 and emerging inside lower mounting aperture 91C
90*	foot structure (fixed) of pallet modules 40, 10*, 20* resp. 30*
91*	fixed foot element(s)
190	through-holes extending from an upper surface to a lower surface of main structural body 100, 200, 300, 400, 100*, 200* resp. 300* and first and second lateral flanges 110, 120, 210, 220, 310, 320, 410, 420, 110*, 120*, 210*, 220*, 310A* resp. 320*
1000	pallet assembly built of multiple pallet modules 10 nested within and interlocked with one another
1000*	pallet assembly built of multiple pallet modules 20, 30 nested within and interlocked with one another
L1	length (and width) of unit-size pallet module 10, 40, resp. 10* ("unit length")
L2	length (and width) of pallet module 20
L3	length of pallet module 30
W3	width of pallet module 30

Claims

1. A pallet module (10; 20; 30; 40; 10*; 20*; 30*) configured to allow formation of a nested pallet assembly (1000; 1000*) of at least two similar pallet modules (10; 20; 30; 40; 10*; 20*; 30*), the pallet module (10; 20; 30; 40; 10*; 20*; 30*) comprising:

- a main structural body (100; 200; 300; 400; 100*; 200*; 300*) exhibiting a generally quadrilateral peripheral border (100A; 200A; 300A; 400A; 100A*; 200A*; 300A*) with first to fourth lateral sides (101-104; 201-204; 301-304; 401-404; 101*-104*; 201-204*; 301-304*) extending between upper and lower sides (100B, 100C; 200B, 200C; 300B, 300C; 400B, 400C; 100B*, 100C*; 200B*, 200C*; 300B*, 300C*) of the main structural body (100; 200; 300; 400; 100*; 200*; 300*);
- first and second lateral flanges (110, 120; 210, 220; 310, 320; 410, 420; 110*, 120*; 210*, 220*; 310*, 320*) extending outwardly from the peripheral border (100A; 200A; 300A; 400A; 100A*; 200A*; 300A*) of the main structural body (100; 200; 300; 400; 100*; 200*; 300*), along the first and second lateral sides (101, 102; 201, 202; 301, 302; 401, 402; 101*, 102*; 201*, 202*; 301*, 302*), the first and second lateral flanges (110, 120; 210, 220; 310, 320; 410, 420; 110*, 120*; 210*, 220*; 310*, 320*) being configured to cooperate with a corresponding side portion of another similar pallet module (10; 20; 30; 40; 10*; 20*; 30*) to form the nested pallet assembly (1000; 1000*); and
- a foot structure (90; 90*) disposed on the lower side (100C; 200C; 300C; 400C; 100C*; 200C*; 300C*) of the main structural body (100; 200; 300; 400; 100*; 200*; 300*),

characterized in that the main structural body (100; 200; 300; 400; 100*; 200*; 300*) exhibits first and

second lateral grooves (130, 140; 230, 240; 330, 340; 430, 440; 130*, 140*; 230*, 240*; 330*, 340*) extending inwardly from the peripheral border (100A; 200A; 300A; 400A; 100A*; 200A*; 300A*) of the main structural body (100; 200; 300; 400; 100*; 200*; 300*), along the third and fourth lateral sides (103, 104; 203, 204; 303, 304; 403, 404; 103*, 104*; 203*, 204*; 303*, 304*), the first and second lateral grooves (130, 140; 230, 240; 330, 340; 430, 440; 130*, 140*; 230*, 240*; 330*, 340*) being each configured to receive the first and second lateral flanges (110, 120; 210, 220; 310, 320; 410, 420; 110*, 120*; 210*, 220*; 310*, 320*), respectively, of another similar pallet module (10; 20; 30; 40; 10*; 20*; 30*), so that the first, respectively second lateral flange (110, 120; 210, 220; 310, 320; 410, 420; 110*, 120*; 210*, 220*; 310*, 320*) of said other similar pallet module (10; 20; 30; 40; 10*; 20*; 30*) nests within the first, respectively second lateral groove (130, 140; 230, 240; 330, 340; 430, 440; 130*, 140*; 230*, 240*; 330*, 340*) to form the nested pallet assembly (1000; 1000*),
and **in that** the pallet module (10; 20; 30; 40; 10*; 20*; 30*) further comprises:

- first and second toggle latch components (51, 52) arranged in the vicinity of the first and second lateral sides (101, 102; 201, 202; 301, 302; 401, 402; 101*, 102*; 201*, 202*; 301*, 302*), respectively; and
- third and fourth toggle latch components (53, 54) arranged in the vicinity of the third and fourth lateral sides (103, 104; 203, 204; 303, 304; 403, 404; 103*, 104*; 203*, 204*; 303*, 304*), respectively,

the first and second toggle latch components (51, 52) being each configured to cooperate and interlock with the third and fourth toggle latch components (53, 54), respectively, of another similar pallet module (10; 20; 30; 40; 10*; 20*; 30*) of the nested pallet assembly (1000; 1000*), to form releasable toggle latches (500) allowing the pallet module (10; 20; 30; 40; 10*; 20*; 30*) to be secured to or released from said other similar pallet module (10; 20; 30; 40; 10*; 20*; 30*).

2. The pallet module (10; 20; 30; 40; 10*; 20*; 30*) according to claim 1, wherein each of the first and second lateral flanges (110, 120; 210, 220; 310, 320; 410, 420; 110*, 120*; 210*, 220*; 310*, 320*) exhibits at least one positioning notch (110A, 120A; 210A, 220A; 310A, 320A; 410A, 420A; 110A*, 120A*; 210A*, 220A*; 310A*, 320A*) formed along an outer edge of the first and second lateral flanges (110, 120; 210, 220; 310, 320; 410, 420; 110*, 120*; 210*, 220*; 310*, 320*),
wherein each of the first and second lateral grooves (130, 140; 230, 240; 330, 340; 430, 440; 130*, 140*; 230*, 240*; 330*, 340*) exhibits at least one protrusion (130A, 140A; 230A, 240A; 330A, 340A; 430A, 440A; 130A*, 140A*; 230A*, 240A*; 330A*, 340A*) configured to mate with the at least one positioning notch (110A, 120A; 210A, 220A; 310A, 320A; 410A, 420A; 110A*, 120A*; 210A*, 220A*; 310A*, 320A*) provided on the first and second lateral flanges (110, 120; 210, 220; 310, 320; 410, 420; 110*, 120*; 210*, 220*; 310*, 320*) of another similar pallet module (10; 20; 30; 40; 10*; 20*; 30*),
and wherein a position of each positioning notch (110A, 120A; 210A, 220A; 310A, 320A; 110A*, 120A*; 210A*, 220A*; 310A*, 320A*) along the outer edge of the first and second lateral flanges (110, 120; 210, 220; 310, 320; 110*, 120*; 210*, 220*; 310*, 320*) and a position of each protrusion (130A, 140A; 230A, 240A; 330A, 340A; 130A*, 140A*; 230A*, 240A*; 330A*, 340A*) within the first and second lateral grooves (130, 140; 230, 240; 330, 340; 130*, 140*; 230*, 240*; 330*, 340*) preferably coincide with a position of each of the first to fourth toggle latch components (51-54) along the first to fourth lateral sides (101-104; 201-204; 301-304; 101*-104*; 201*-204*; 301*-304*).

3. The pallet module (10; 20; 30; 40; 10*; 20*; 30*) according to any one of the preceding claims, wherein the first and second lateral flanges (110, 120; 210, 220; 310, 320; 410, 420; 110*, 120*; 210*, 220*; 310*, 320*) are offset sideways with respect to the first and second lateral sides (101, 102; 201, 202; 301, 302; 401, 402; 101*, 102*; 201*, 202*; 301*, 302*),
and wherein the first and second lateral flanges (110, 120; 210, 220; 310, 320; 110*, 120*; 210*, 220*; 310*, 320*) are optionally joined together to form an L-shaped lateral flange.

4. The pallet module (10; 20; 30; 40; 10*; 20*; 30*) according to any one of the preceding claims, wherein the first to fourth toggle latch components (51-54) are provided on the upper side (100B; 200B; 300B; 400B; 100B*; 200B*; 300B*) of the main structural body (100; 200; 300; 400; 100*; 200*; 300*) at least partly within recesses (151-154; 251-254; 351-354; 451-454; 151*-154*; 251*-254*; 351*-354*) formed below an upper surface of the upper side (100B; 200B; 300B; 400B; 100B*; 200B*; 300B*) of the main structural body (100; 200; 300; 400; 100*; 200*; 300*).

5. The pallet module (10; 20; 30; 40; 10*; 20*; 30*) according to any one of the preceding claims, wherein the first and second toggle latch components (51, 52) are spring-loaded latch elements comprising a moveable latch section (510) that extends outwardly beyond the peripheral border (100A; 200A; 300A;

400A; 100A*; 200A*; 300A*) of the main structural body (100; 200; 300; 400; 100*; 200*; 300*),
wherein the third and fourth toggle latch components (53, 54) are catch elements comprising a catch section (550) configured to cooperate with the moveable latch section (510) of the spring-loaded latch elements of another similar pallet module (10; 20; 30; 40; 10*; 20*; 30*),
and wherein the first and second toggle latch components (51, 52) are preferably manually-actuatable spring-loaded latch elements further comprising a handle section (520) that is mechanically linked to the moveable latch section (510) to allow manual actuation of the first and second toggle latch components (51, 52).

6. The pallet module (10; 20; 30; 40; 10*; 20*; 30*) according to any one of the preceding claims, wherein the first and second lateral flanges (110, 120; 210, 220; 310, 320; 410, 420; 110*, 120*; 210*, 220*; 310*, 320*) are formed integrally with the main structural body (100; 200; 300; 400; 100*; 200*; 300*),
and wherein the main structural body (100; 200; 300; 400; 100*; 200*; 300*) and the first and second lateral flanges (110, 120; 210, 220; 310, 320; 410, 420; 110*, 120*; 210*, 220*; 310*, 320*) are preferably made of plastic.

7. The pallet module (10; 20; 30; 40; 10*; 20*; 30*) according to claim 6, further comprising a plurality of reinforcing elements (161, 162; 261, 262; 361, 362; 461, 462; 161*, 162*; 261*, 262*; 361*, 362*) extending within the main structural body (100; 200; 300; 400; 100*; 200*; 300*) and the first and/or second lateral flanges (110, 120; 210, 220; 310, 320; 410, 420; 110*, 120*; 210*, 220*; 310*, 320*),
which reinforcing elements (161, 162; 261, 262; 361, 362; 461, 462; 161*, 162*; 261*, 262*; 361*, 362*) are preferably made of a metal, such as aluminium, of a metal alloy, or of a composite material.

8. The pallet module (10; 20; 30; 40; 10*; 20*; 30*) according to claim 7, wherein the reinforcing elements (161, 162; 261, 262; 361, 362; 461, 462; 161*, 162*; 261*, 262*; 361*, 362*) are longitudinal rod elements extending between upper and lower surfaces of the main structural body (100; 200; 300; 400; 100*; 200*; 300*) and of the first and/or second lateral flanges (110, 120; 210, 220; 310, 320; 410, 420; 110*, 120*; 210*, 220*; 310*, 320*),
and wherein the plurality of reinforcing elements (161, 162; 261, 262; 361, 362; 461, 462; 161*, 162*; 261*, 262*; 361*, 362*) preferably includes a first series of longitudinal rod elements (161; 261; 361; 461; 161*; 261*; 361*) extending in a first direction and second series of longitudinal rod elements (162; 262; 362; 462; 162*; 262*; 362*) extending in a second direction distinct from the first direction.

9. The pallet module (10; 20; 30; 40; 10*; 20*; 30*) according to any one of the preceding claims, further comprising at least one cover element (170, 180; 170', 180'; 170*, 180*) configured to cover an upper side of the first lateral flange (110; 210; 310; 410; 110*; 210*; 310*) and/or second lateral flange (120; 220; 320; 420; 120*; 220*; 320*), each cover element (170, 180; 170', 180'; 170*, 180*) having an upper surface that is flush with an upper surface of the upper side (100B; 200B, 300B; 400B; 100B*; 200B*, 300B*) of the main structural body (100; 200; 300; 400; 100*; 200*; 300*),
and wherein said at least one cover element (170, 180; 170', 180'; 170*, 180*) comprises at least one toggle latch component (71, 81) configured to cooperate and interlock with a corresponding one of the first and second latch components (51, 52) to form a releasable toggle latch (500) allowing the cover element (170, 180) to be secured to or released from the pallet module (10; 20; 30; 40; 10*; 20*; 30*).

10. The pallet module (10; 20; 30) according to any one of the preceding claims, wherein the foot structure (90) is configured as a releasable foot structure comprising one or more releasable foot elements (91) that can each be secured to or removed from a corresponding foot-receiving element (92) provided on the lower side (100C; 200C; 300C) of the main structural body (100; 200; 300),
and wherein each releasable foot element (91) is preferably connected to the foot-receiving element (92) by means of a spring-loaded locking mechanism (91A, 91B, 92A, 95) configured to allow the releasable foot element (91) to be manually inserted into and automatically interlock with the foot-receiving element (92) without this requiring any tool.

11. A pallet module (10; 20; 30) configured to allow formation of a nested assembly (1000; 1000*) of at least two similar pallet modules (10; 20; 30), the pallet module (10; 20; 30) comprising:

- a main structural body (100; 200; 300) exhibiting a generally quadrilateral peripheral border (100A; 200A; 300A) with first to fourth lateral sides (101-104; 201-204; 301-304) extending between upper and lower sides (100B, 100C; 200B, 200C; 300B, 300C) of the main structural body (100; 200; 300);
- a mating system (110, 120, 130, 140; 210, 220, 230, 240; 310, 320, 330, 340) provided on the first to fourth lateral sides (101-104; 201-204; 301-304) of the main structural body (100A; 200A; 300A) configured to allow nesting of the pallet module (10; 20; 30) within a corresponding part of the mating system (110, 120, 130, 140; 210, 220, 230, 240; 310, 320, 330, 340) of another similar pallet module (10; 20; 30) to form

the nested pallet assembly (1000; 1000*);
- a securing system (51-54) configured to allow the pallet module (10; 20; 30) to be secured to or released from another similar pallet module (10; 20; 30) of the nested pallet assembly (1000; 1000*); and
- a foot structure (90) disposed on the lower side (100C; 200C; 300C) of the main structural body (100; 200; 300),

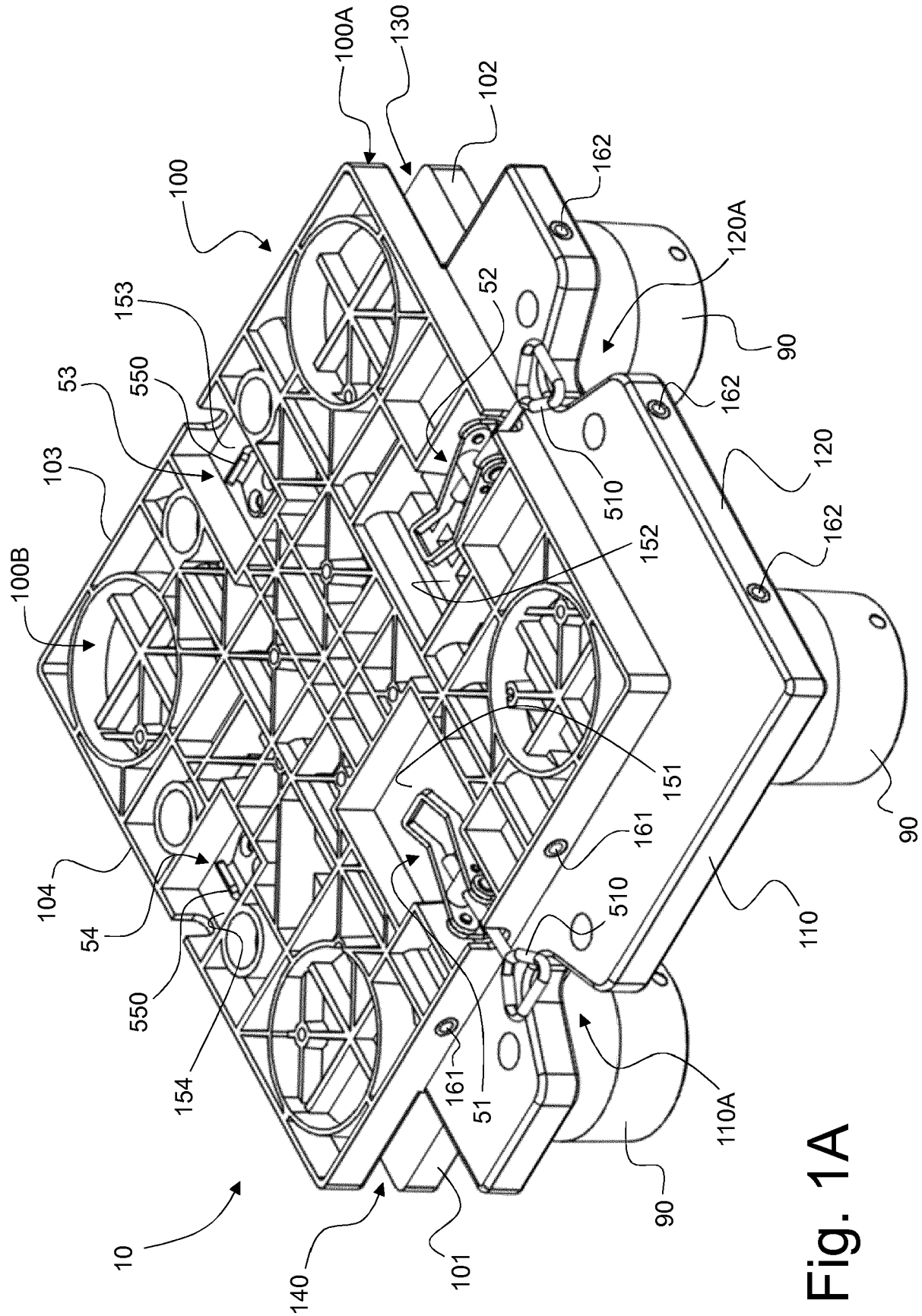
characterized in that the foot structure (90) is configured as a releasable foot structure comprising one or more releasable foot elements (91) that can each be secured to or removed from a corresponding foot-receiving element (92) provided on the lower side (100C; 200C; 300C) of the main structural body (100; 200; 300), and **in that** each releasable foot element (91) is connected to the foot-receiving element (92) by means of a spring-loaded locking mechanism (91A, 91B, 92A, 95) configured to allow the releasable foot element (91) to be manually inserted into and automatically interlock with the foot-receiving element (92) without this requiring any tool.

12. The pallet module (10; 20; 30) according to claim 10 or 11, wherein the spring-loaded locking mechanism (91A, 91B, 92A, 95) includes a mounting aperture (92A) provided on each foot-receiving element (92) and configured to receive a head portion (91A) of each releasable foot element (91), which head portion (91A) is provided with a retaining section (91B) configured to cooperate, upon axial insertion of the head portion (91A) inside the mounting aperture (92A), with a plurality of spring-loaded retaining elements (95) provided on each foot-receiving element (92) and emerging inside the mounting aperture (92A),
wherein a spacing (92C) is preferably provided between each foot-receiving element (92) and each releasable foot element (91) to allow lateral insertion of a tool for the purpose of releasing the releasable foot element (91) from the foot-receiving element (92), and/or
wherein each releasable foot element (91) is preferably further provided with a lower mounting aperture (91C) configured and dimensioned to receive a head portion (91A) of another foot element (91) and with a plurality of spring-loaded retaining elements (95*) emerging inside the lower mounting aperture (91C) and configured to cooperate with and retain the retaining section (91B) of another foot element (91) upon axial insertion of the head portion (91A) inside the lower mounting aperture (91C).

13. The pallet module (10; 20; 30; 40; 10*; 20*; 30*) according to any one of the preceding claims, wherein through-holes (190) are provided in said main structural body (100; 200; 300; 400; 100*; 200*; 300*) and said first and second lateral flanges (110, 120; 210, 220; 310, 320; 410, 420; 110*, 120*; 210*, 220*; 310*, 320*) next to the toggle latch components (51-54), which through-holes (190) extend from an upper surface to a lower surface of the main structural body (100; 200; 300; 400; 100*; 200*; 300*) and said first and second lateral flanges (110, 120; 210, 220; 310, 320; 410, 420; 110*, 120*; 210*, 220*; 310*, 320*).

14. An assortment of pallet modules (10; 20; 30; 40; 10*; 20*; 30*) in accordance with any one of the preceding claims produced in at least two different sizes, wherein said assortment of pallet modules (10; 20; 30; 40; 10*; 20*; 30*) includes a unit-size pallet module (10; 40; 10*) whose main structural body (100; 400; 100*) exhibits a unit size and at least one larger-size pallet module (20; 30; 20*; 30*) whose main structural body (200; 300; 200*; 300*) exhibits a length (L2; L3) corresponding to an integer multiple of a length (L1) of the main structural body (100; 400; 100*) of the unit-size pallet module (10; 40; 10*), the unit-size pallet module (10; 40; 10*) and the at least one larger-size pallet module (20; 30; 20*; 30*) being combinable with one another.

15. A pallet assembly (1000; 1000*) built of multiple pallet modules (10; 20; 30; 40; 10*; 20*; 30*) according to any one of the preceding claims, which pallet modules (10; 20; 30; 40; 10*; 20*; 30*) are nested within and interlocked with one another.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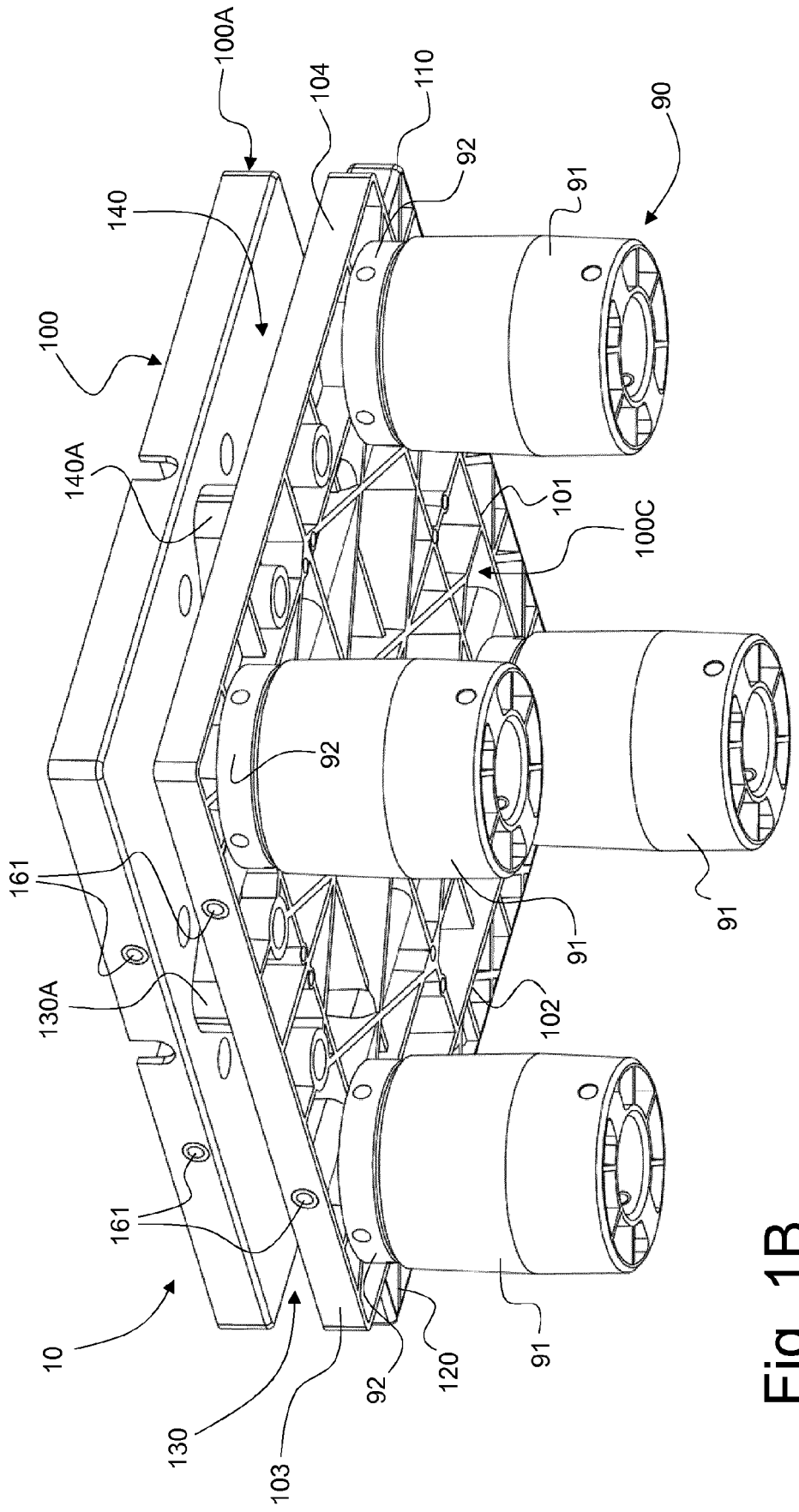
162
100
120A
153
52
550
90
53
162
103
120
510
152
162
100B
151
161
90
104
510
54
110
550
154
161
51
110A
90
10
140
101

Fig. 1A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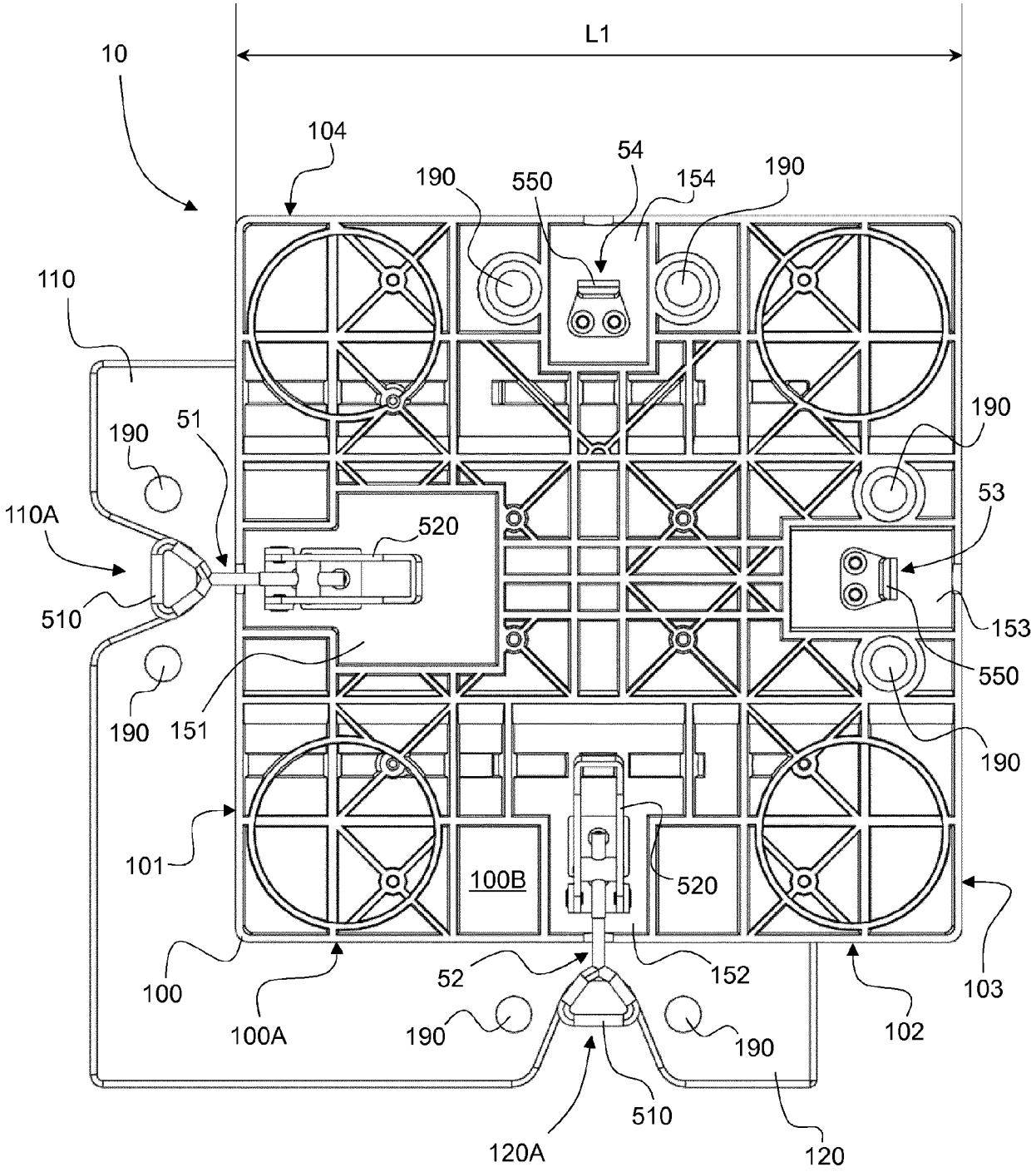
104
110
90
140
92
91
100
140A
101
100C
92
161
91
130A
102
91
161
10
92
120
91
130
103

Fig. 1B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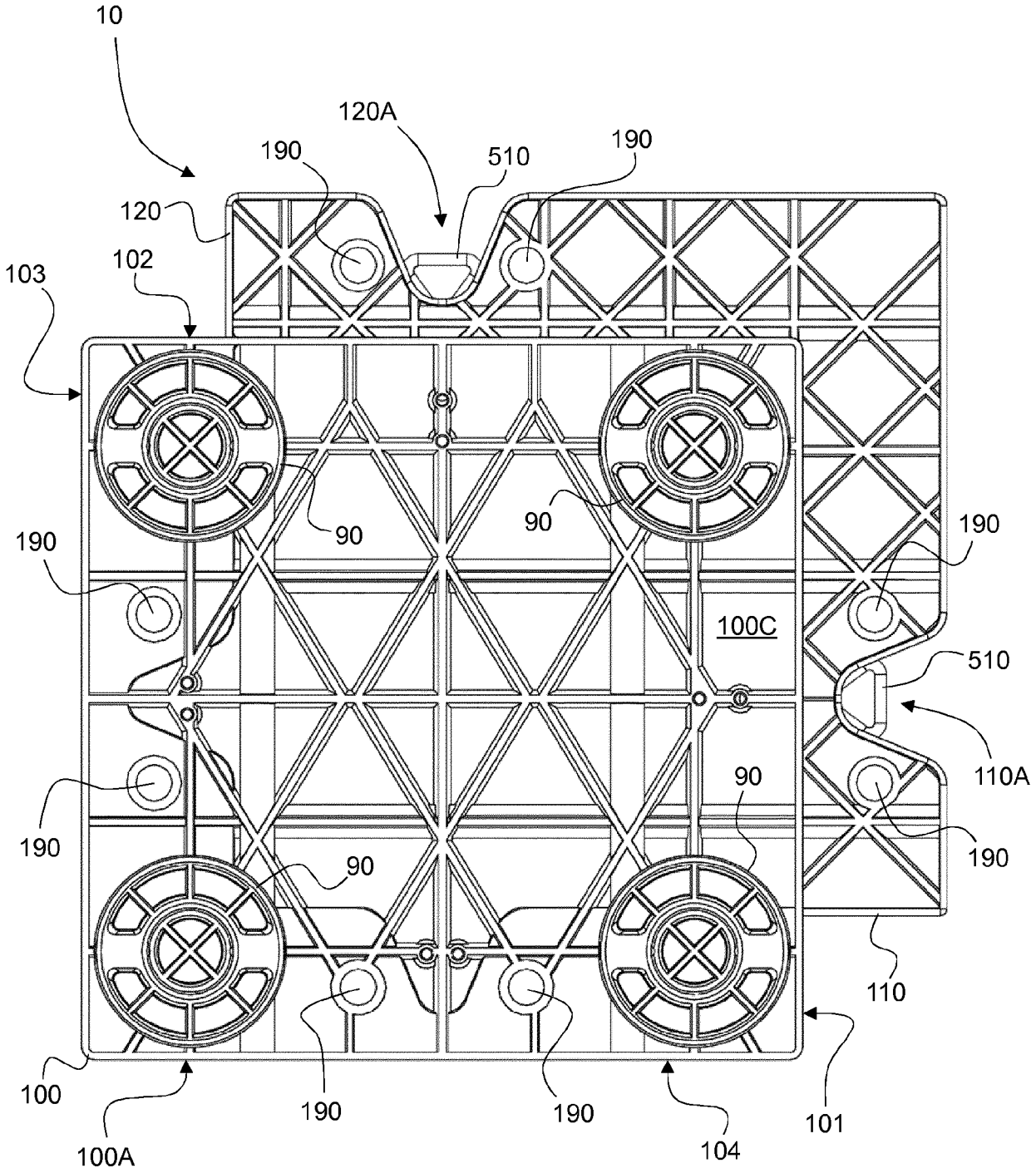
104
54
190
550
154
190
110
190
51
190
110A
520
53
510
153
550
190
151
190
101
100B
520
100
52
152
103
100A
190
190
102
510
120A
120

Fig. 1C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510
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102
103
90
90
190
190
100C
510
110A
90
190
190
90
110
100
190
190
104
101
100A

Fig. 1D

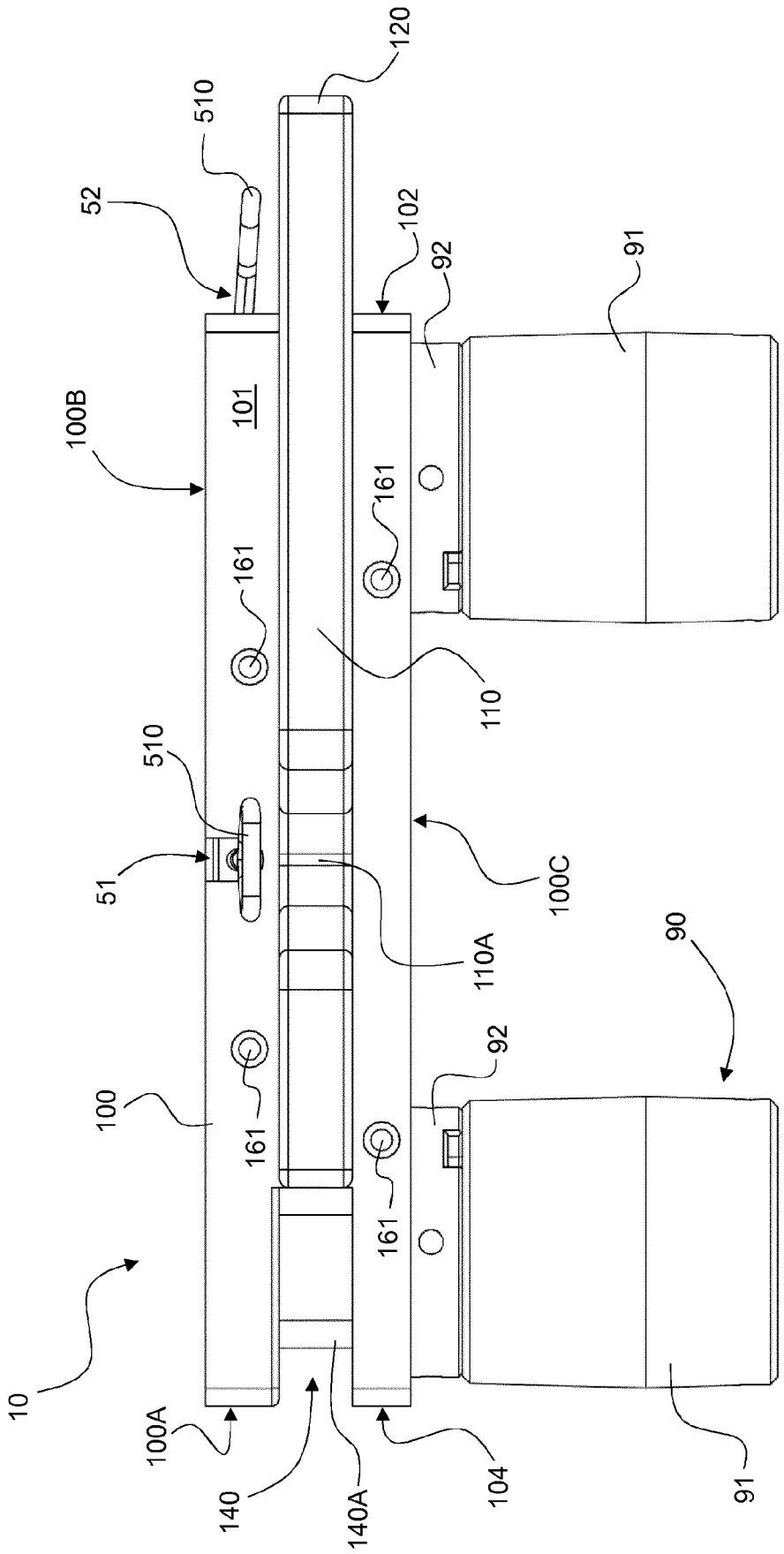
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Fig. 1E

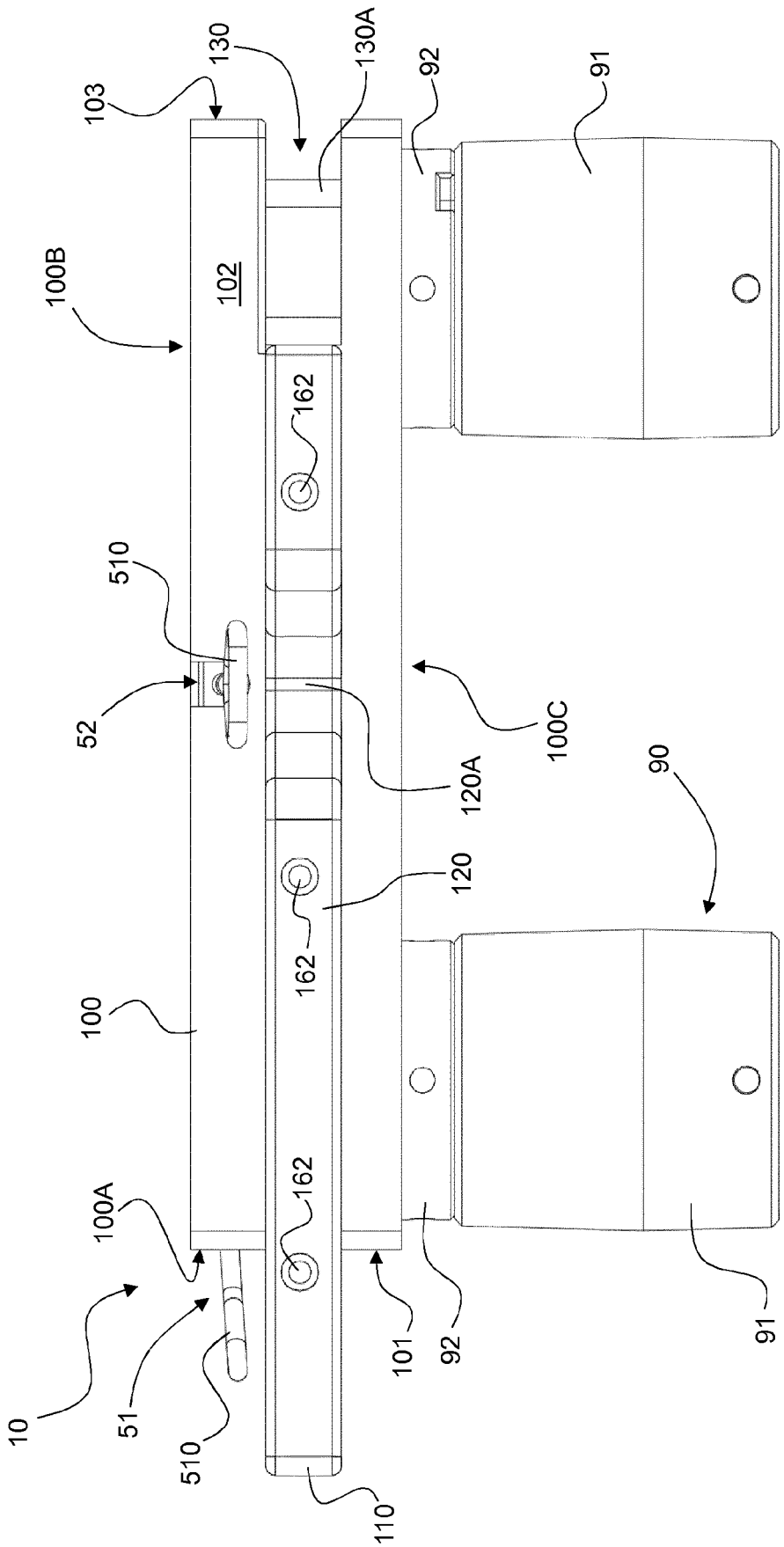
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Fig. 1F

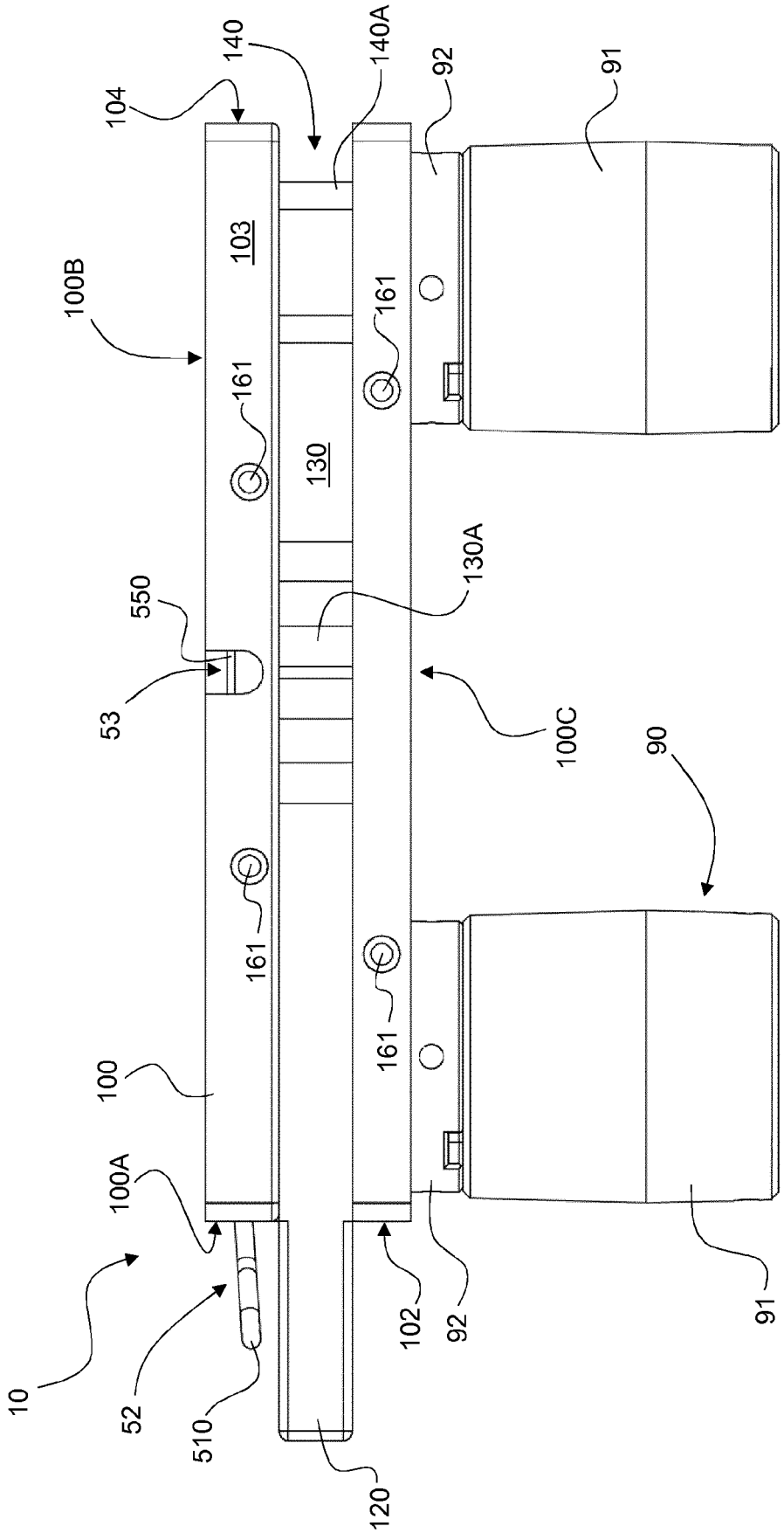
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Fig. 1G

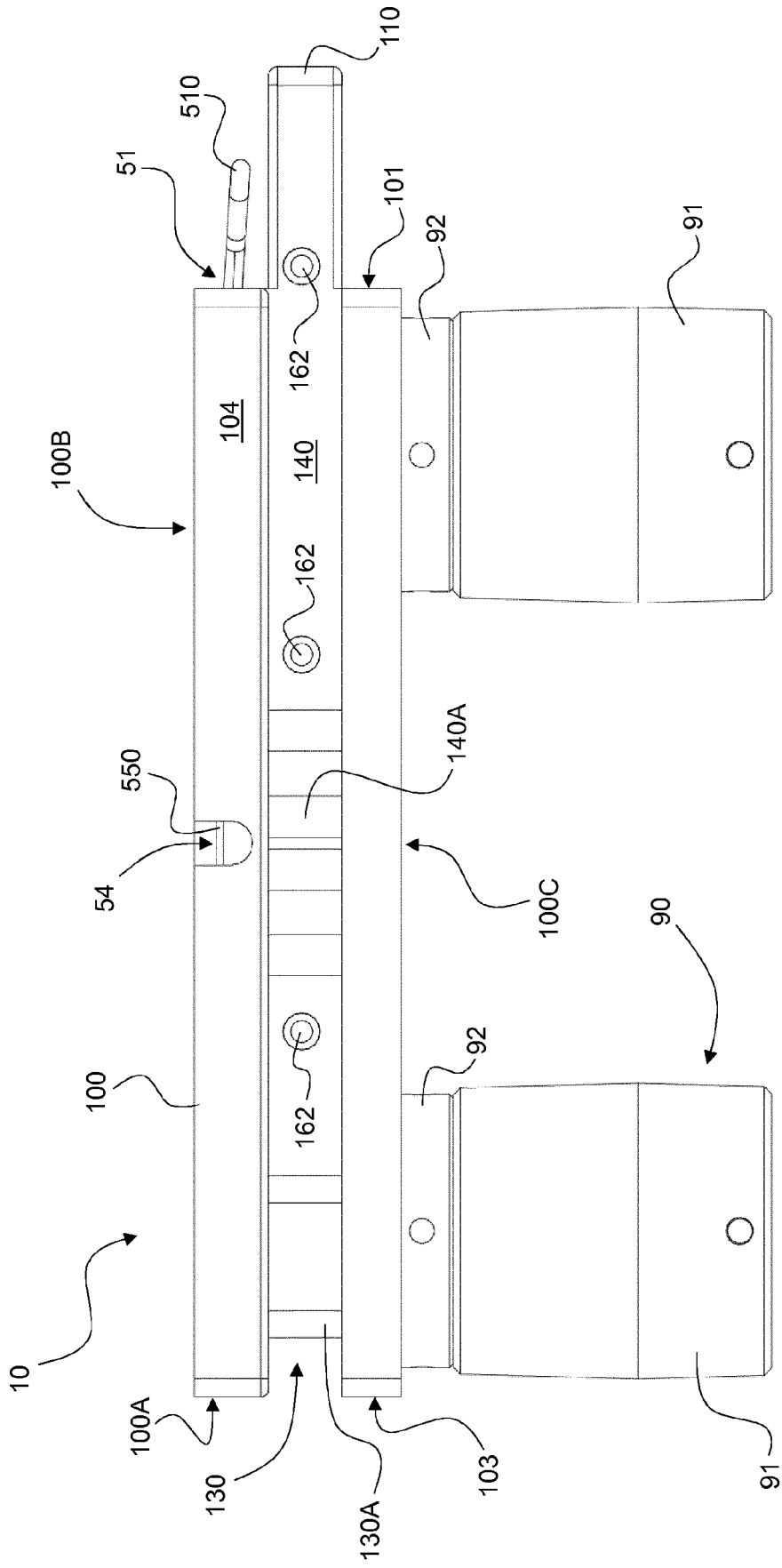
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Fig. 1H

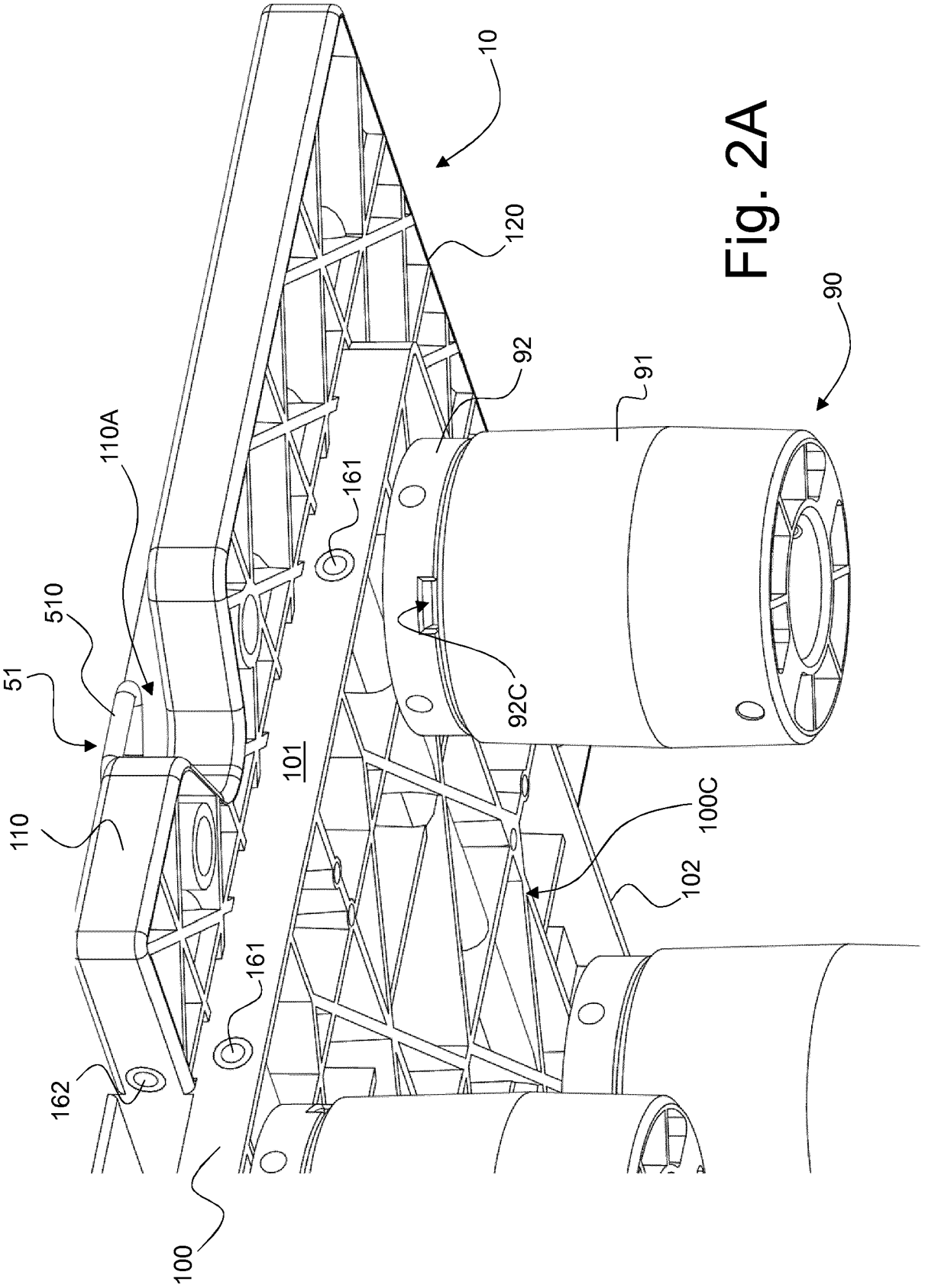

Fig. 2A

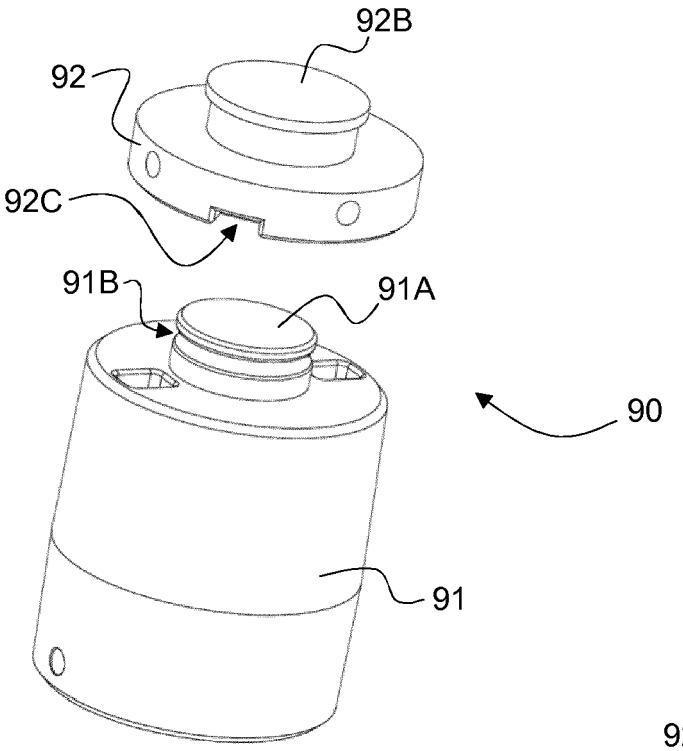

Fig. 2B

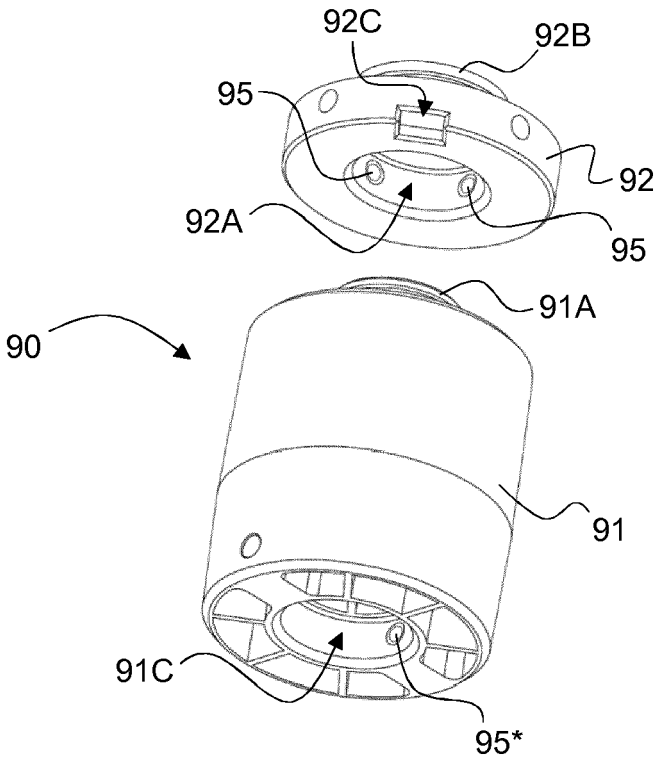

Fig. 2C

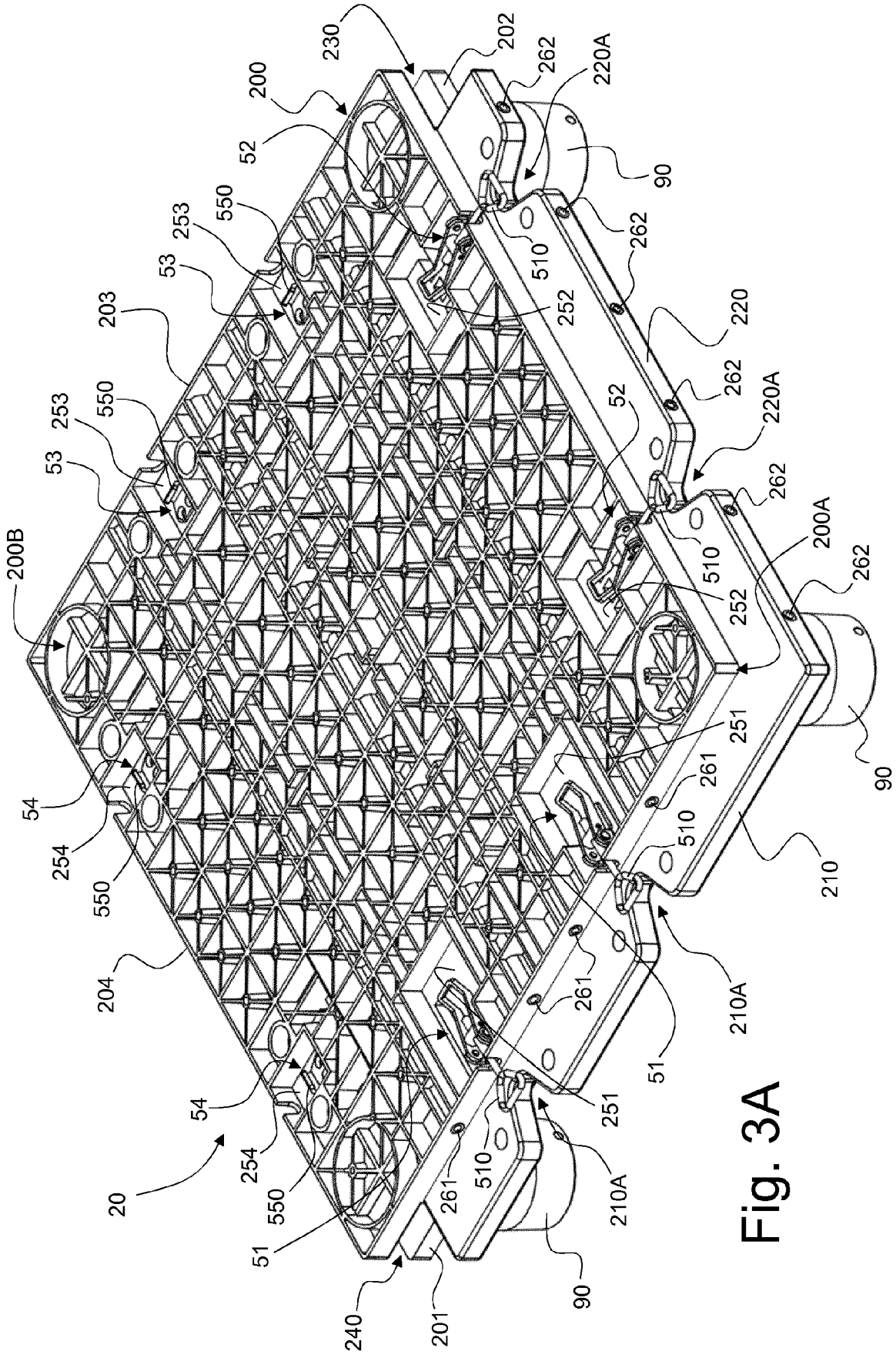
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Fig. 3A

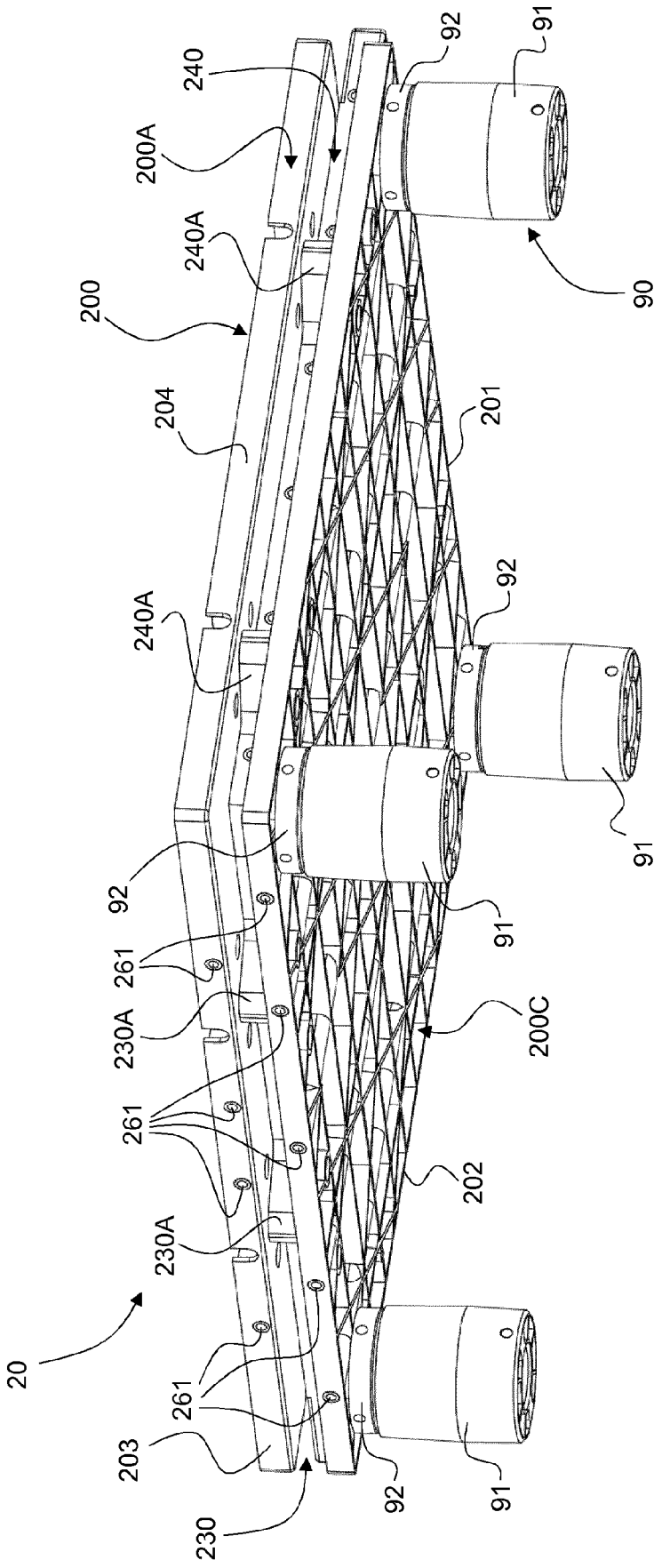

Fig. 3B

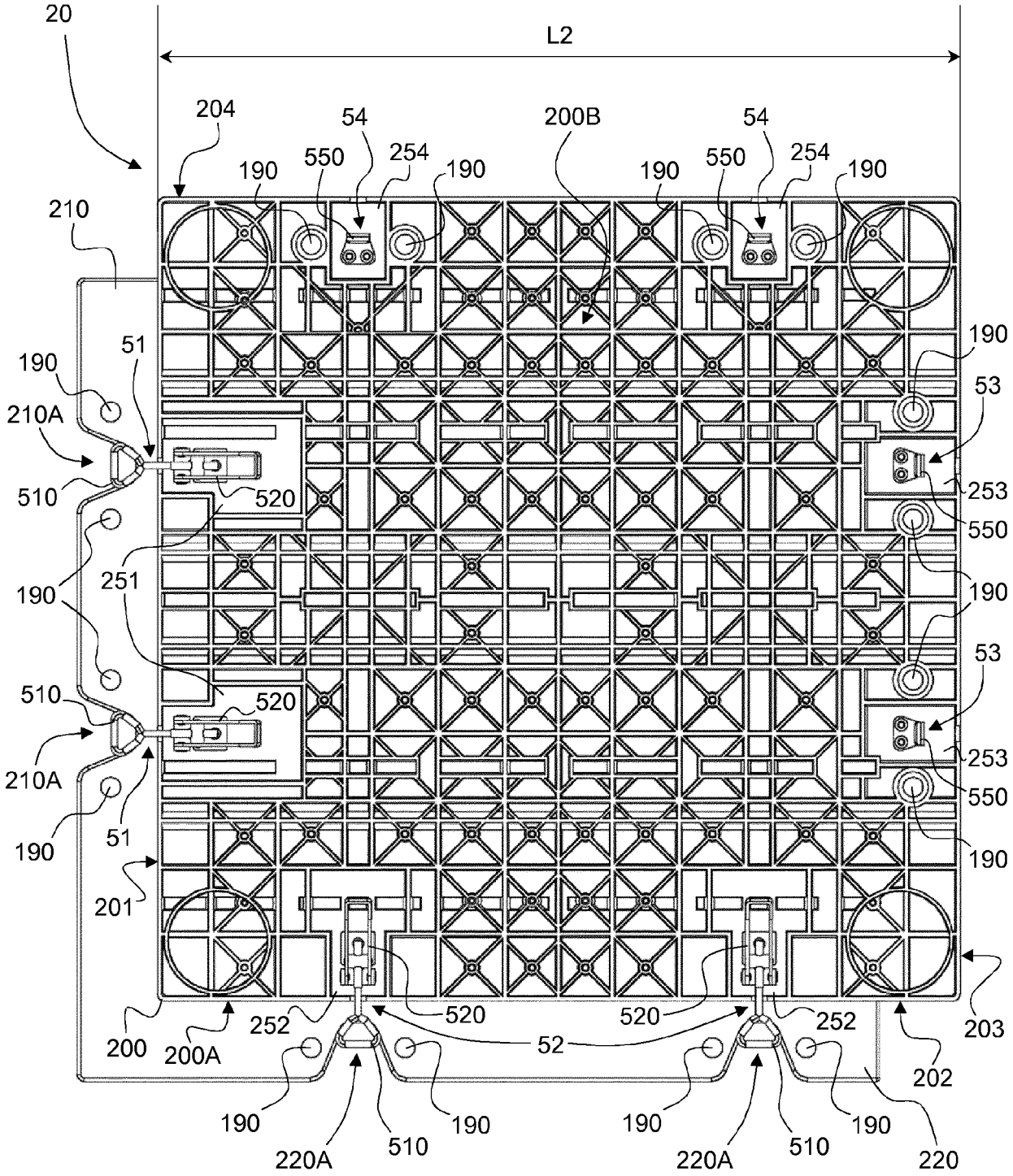
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Fig. 3C

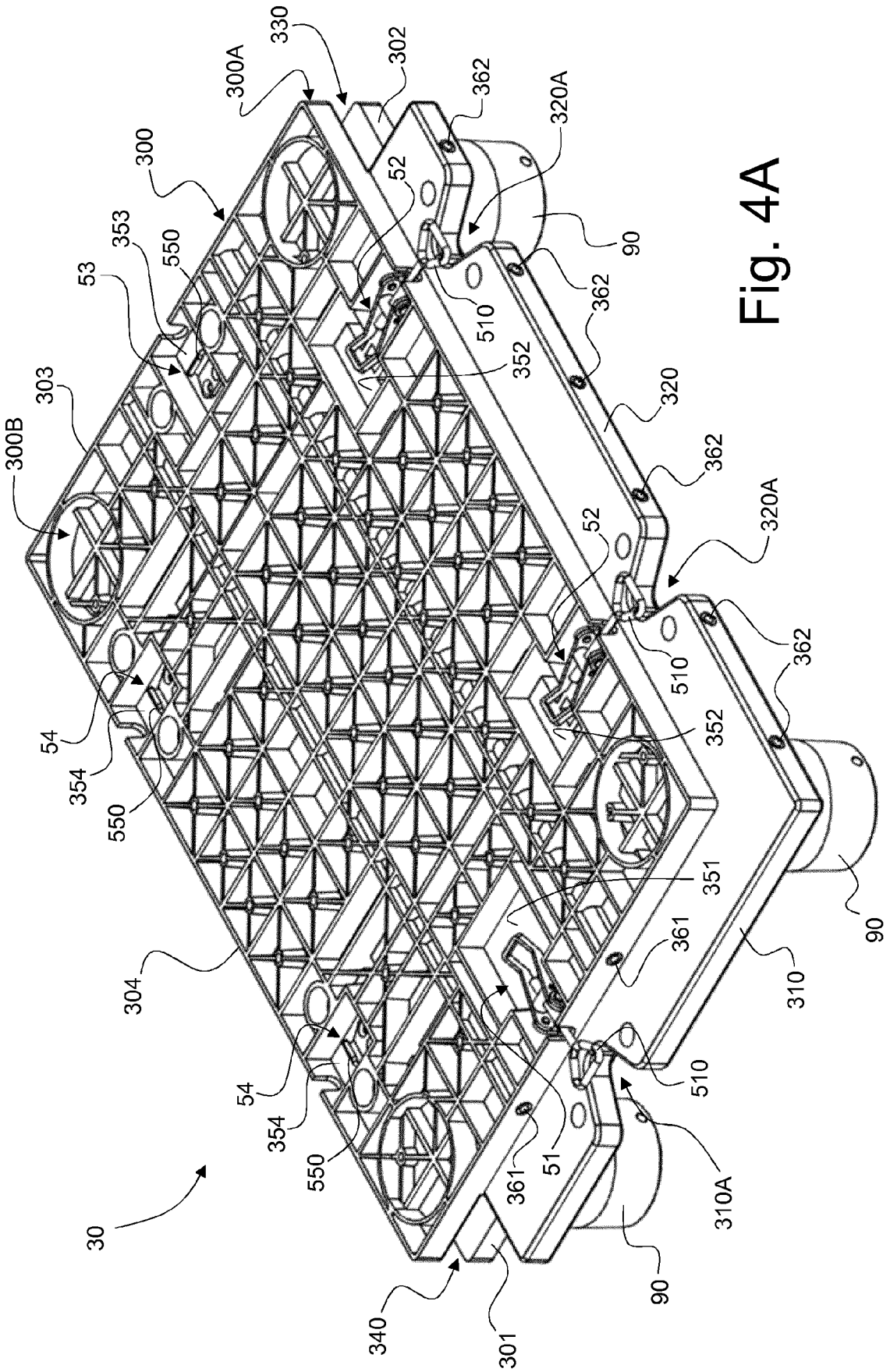
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Fig. 4A

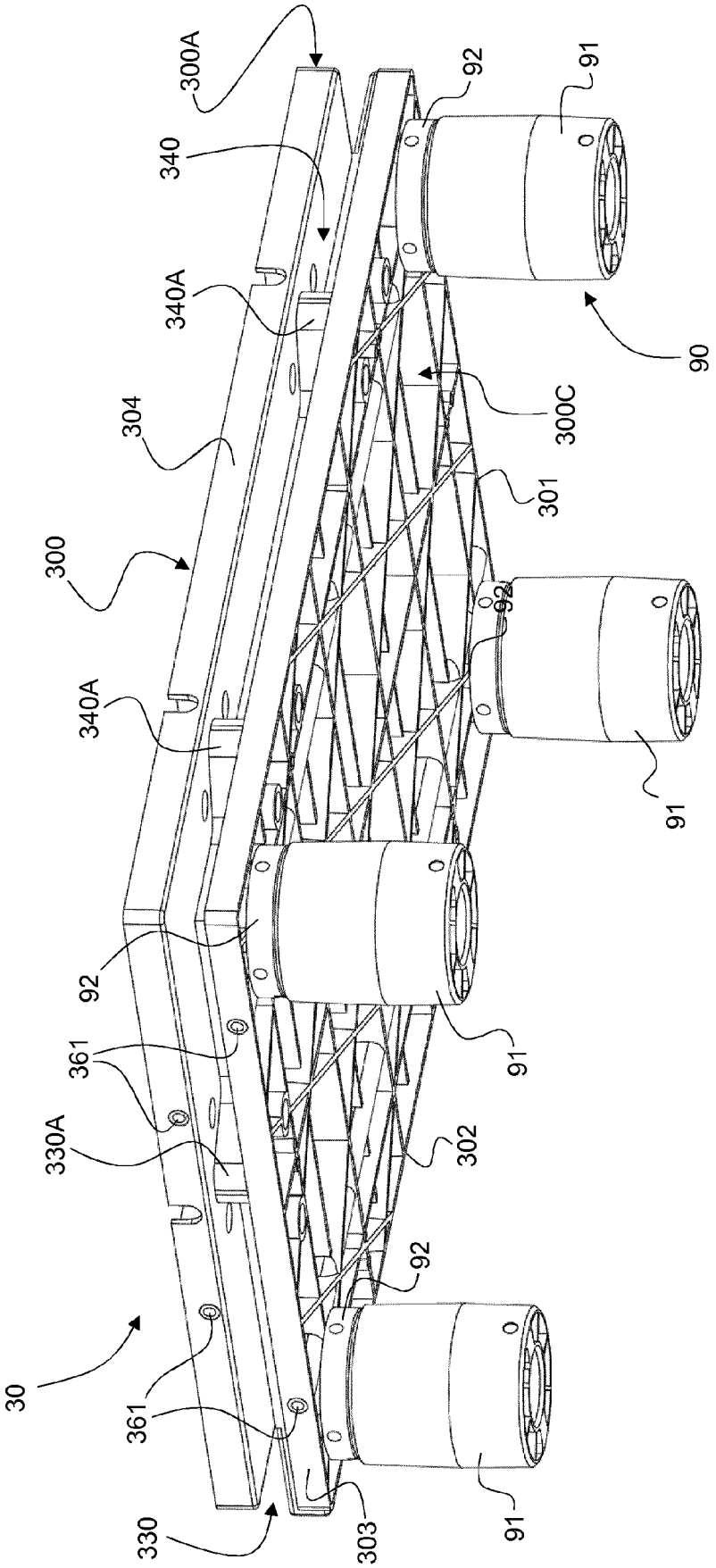
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Fig. 4B

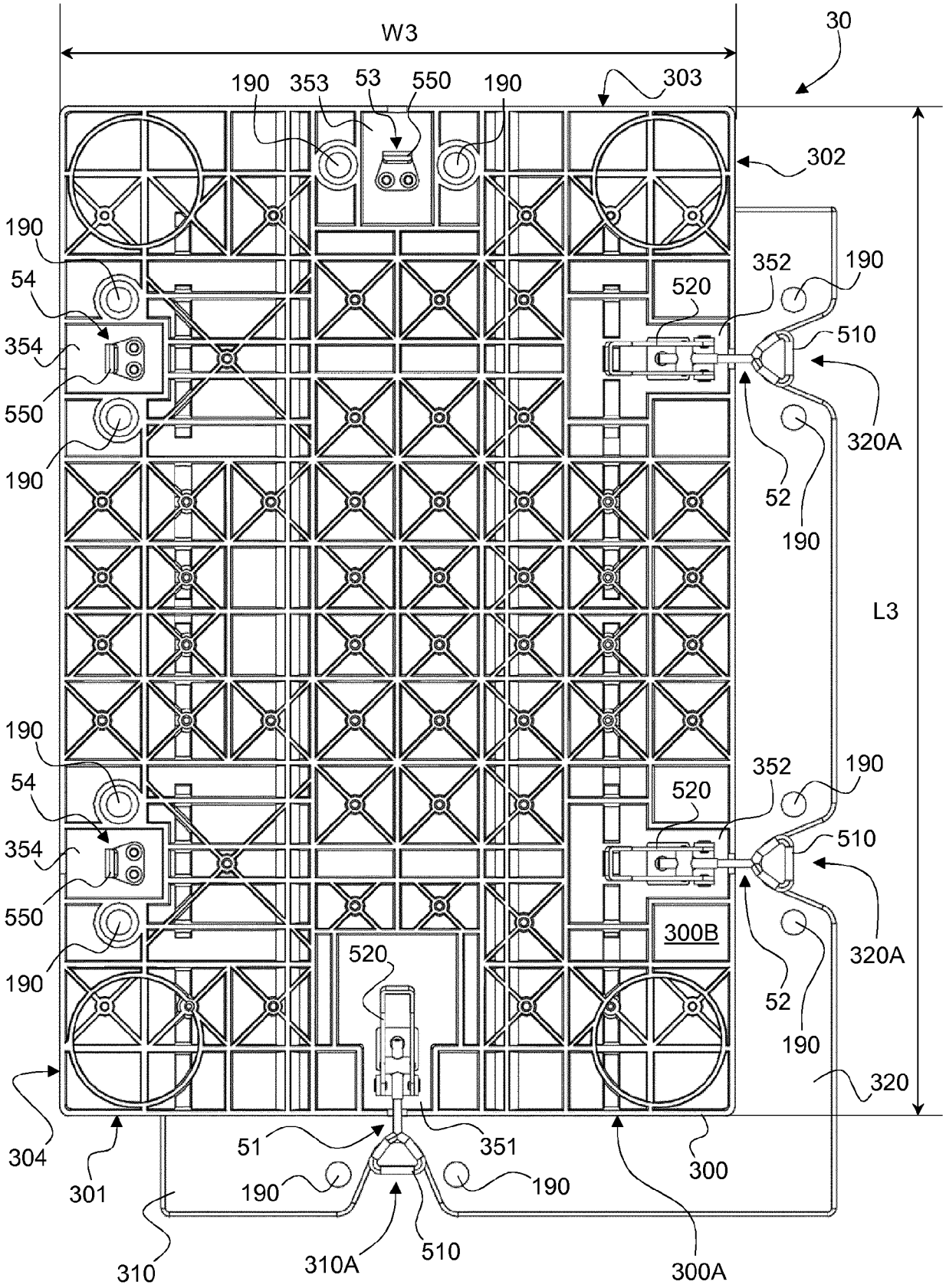
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Fig. 4C

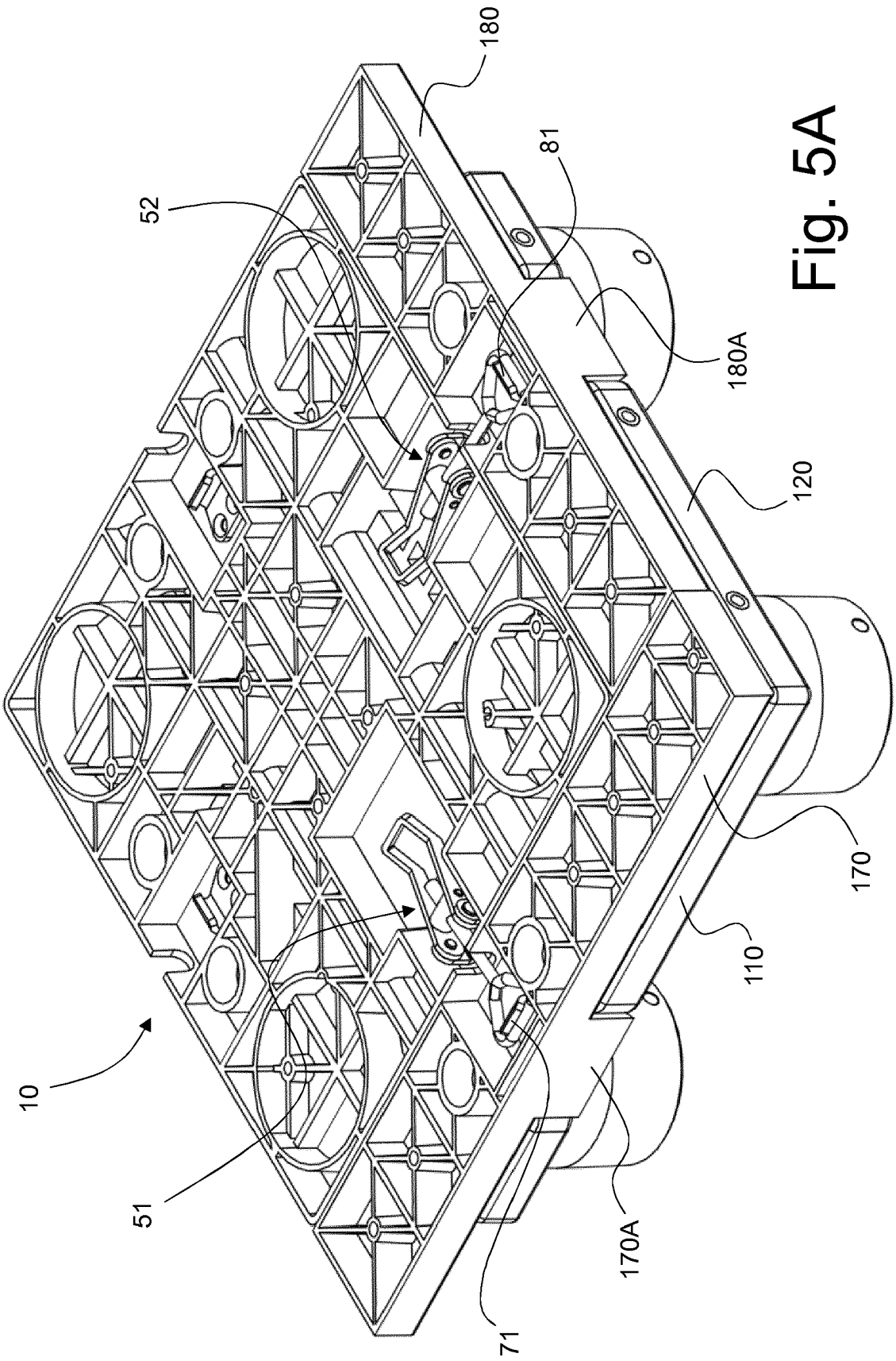

Fig. 5A

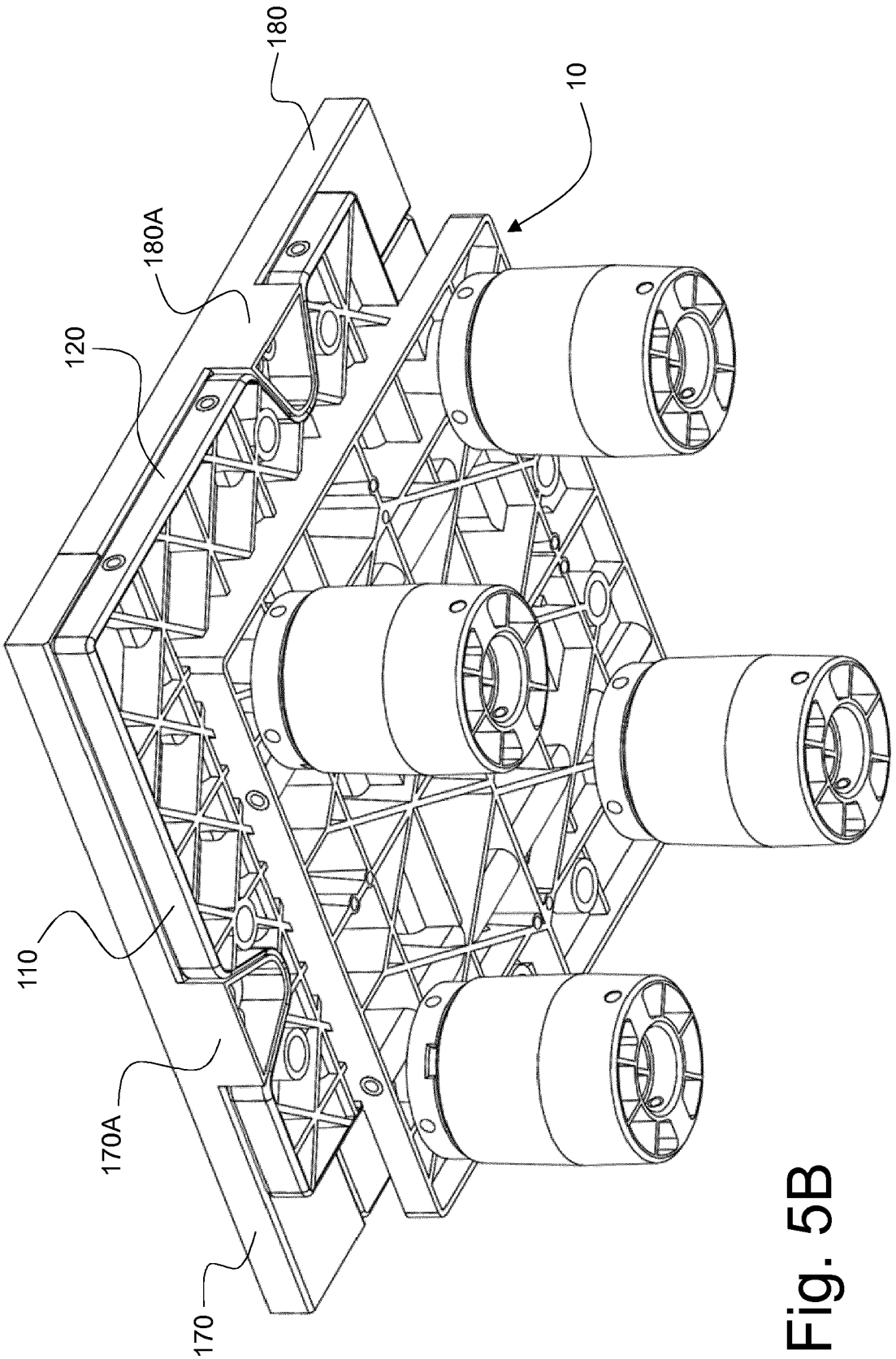

Fig. 5B

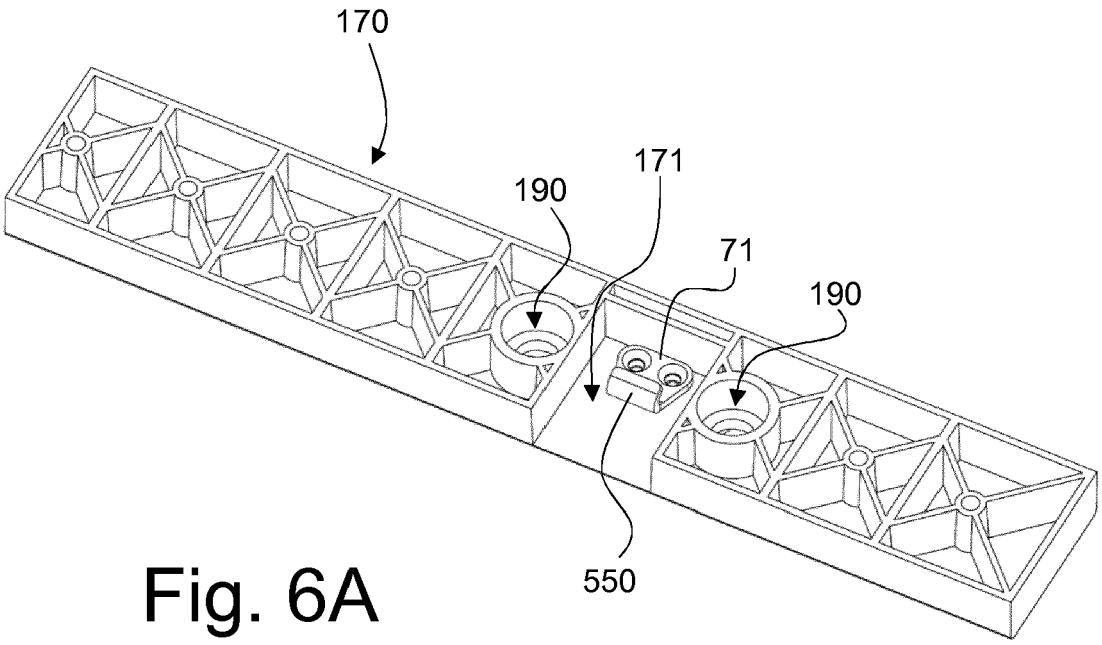

Fig. 6A

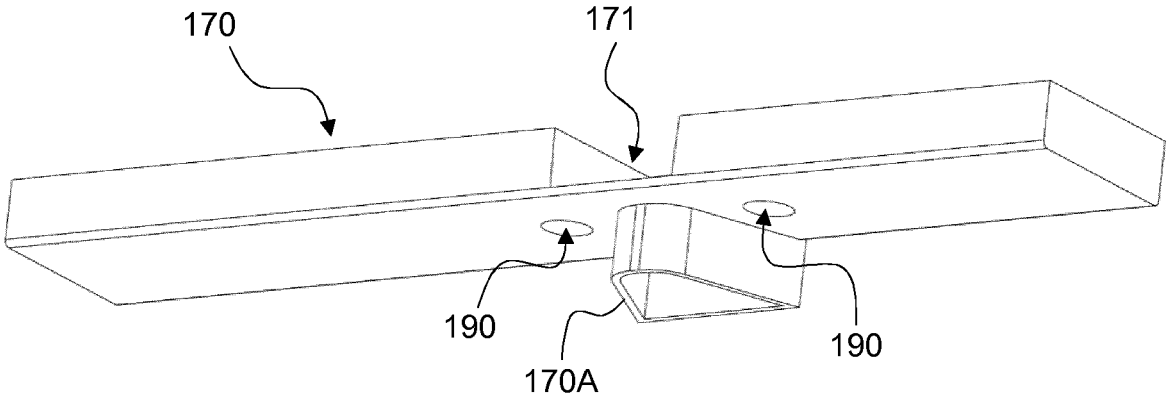

Fig. 6B

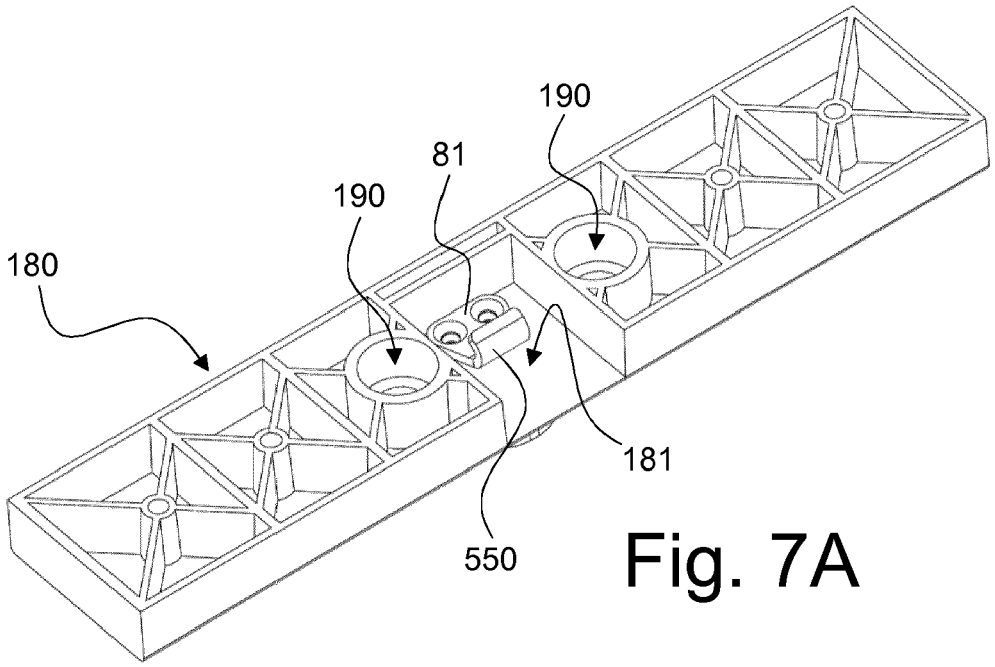

Fig. 7A

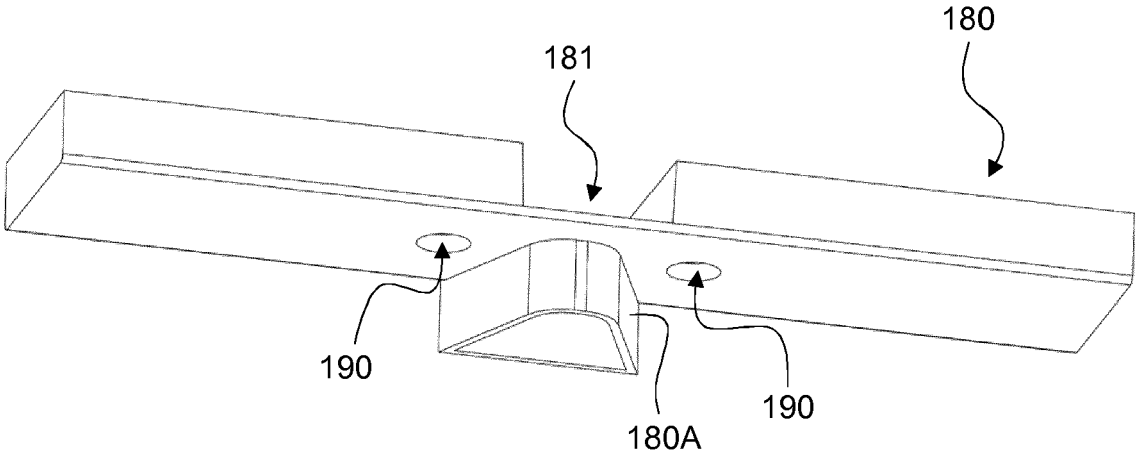

Fig. 7B

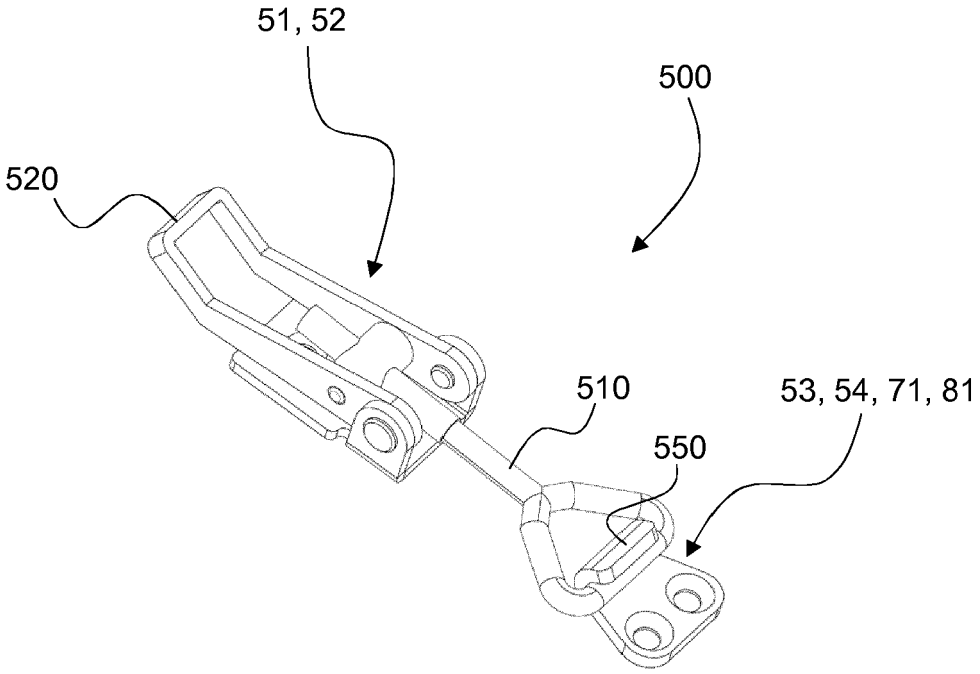

Fig. 8

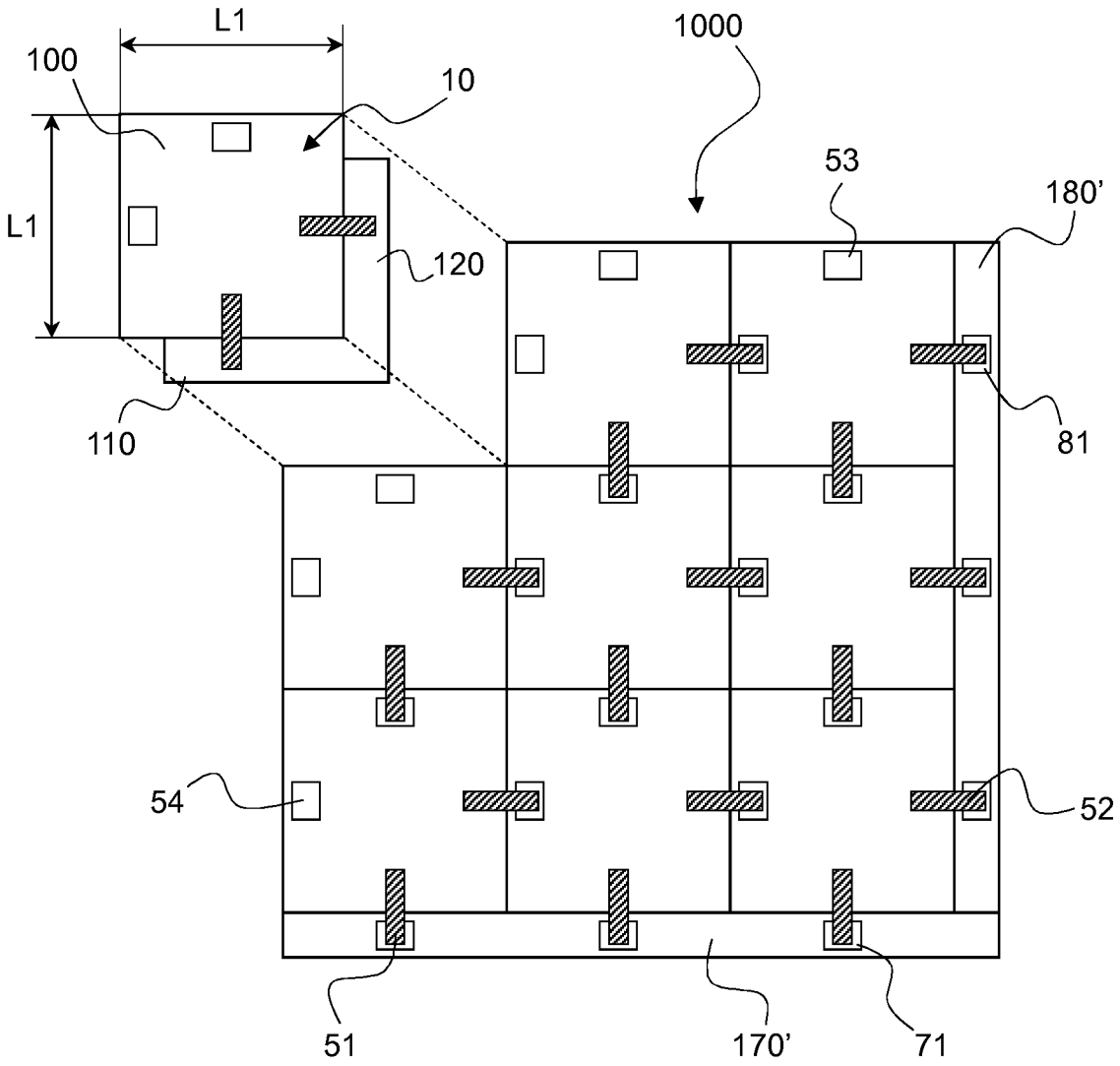

Fig. 9A

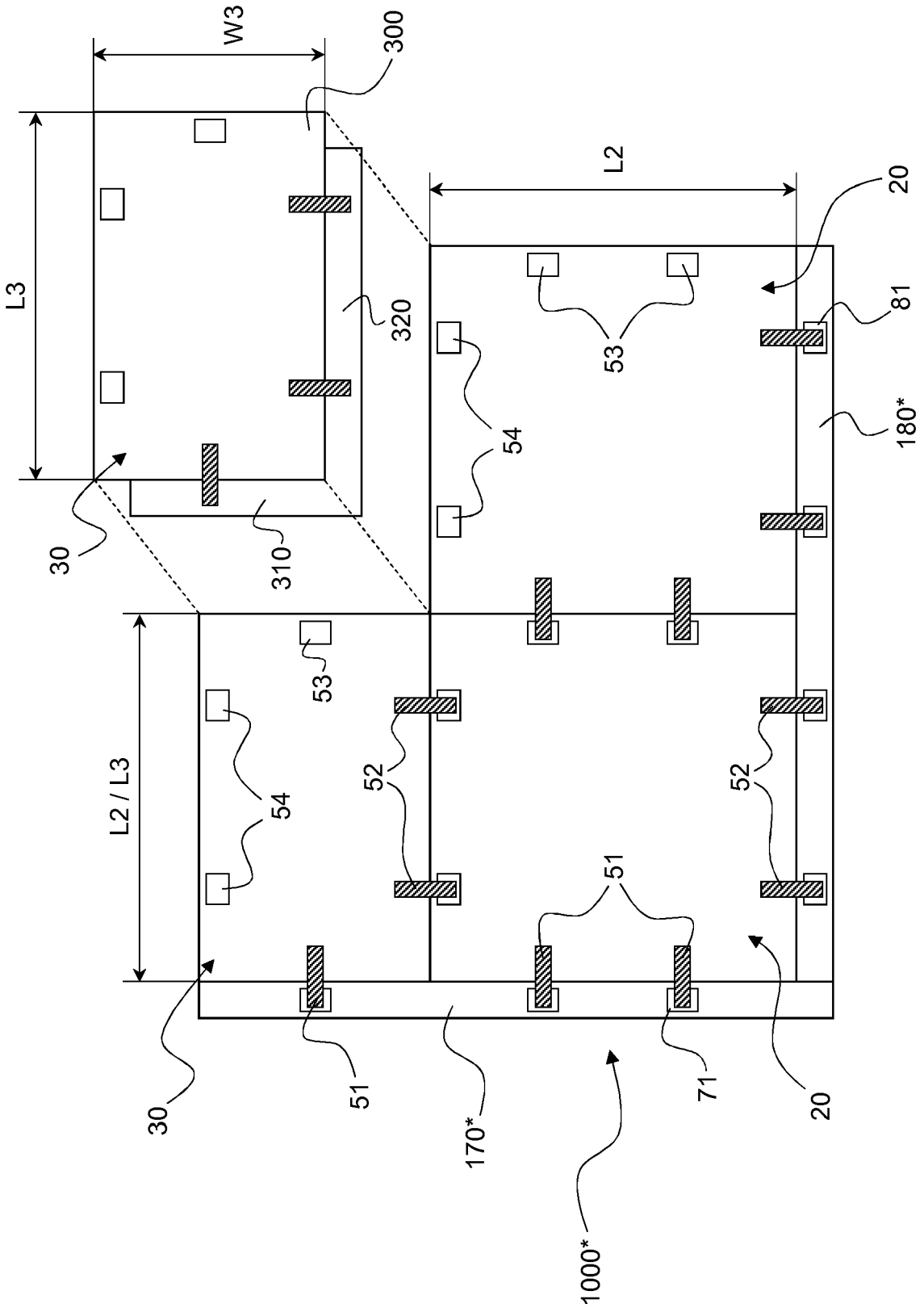
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Fig. 9B

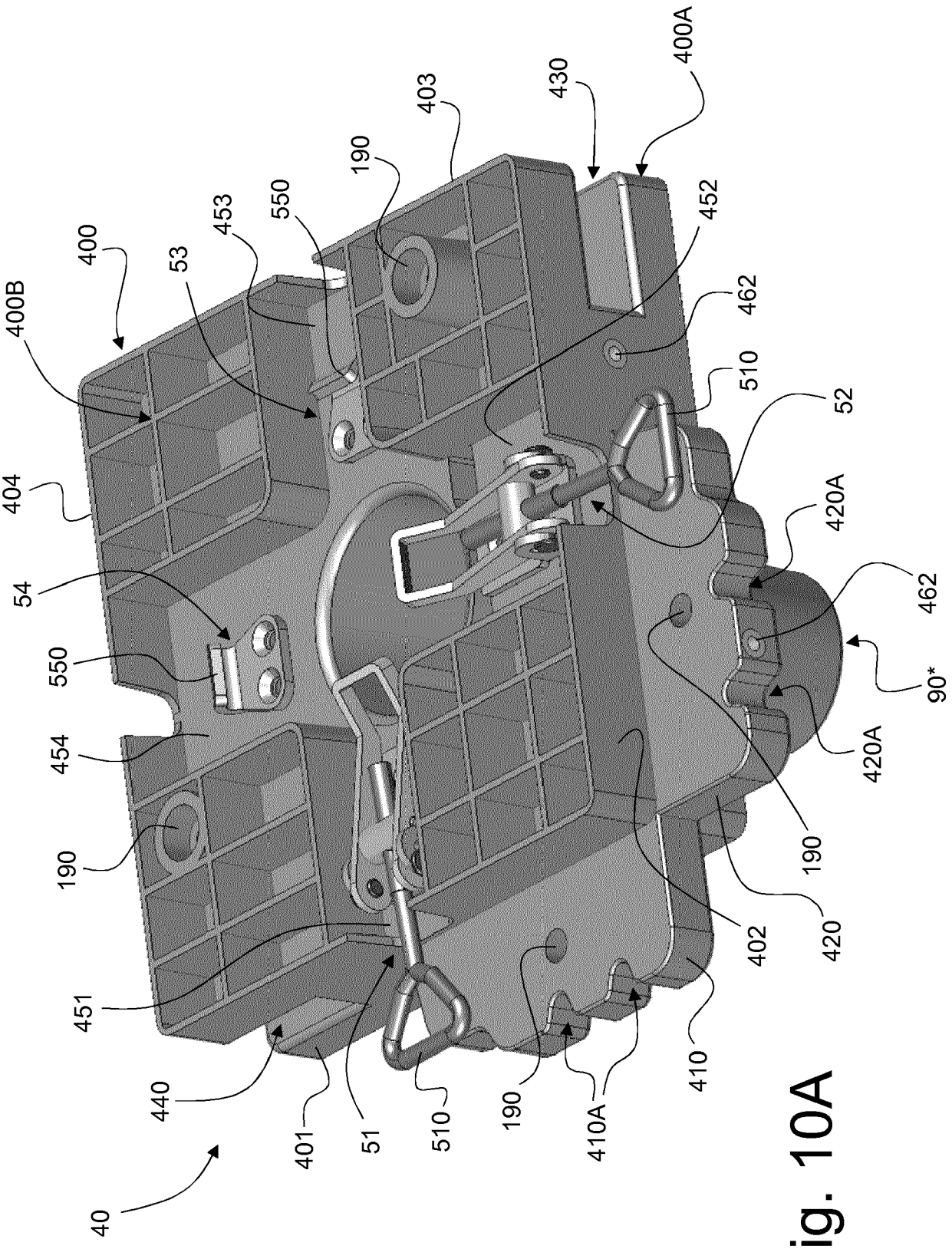
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Fig. 10A

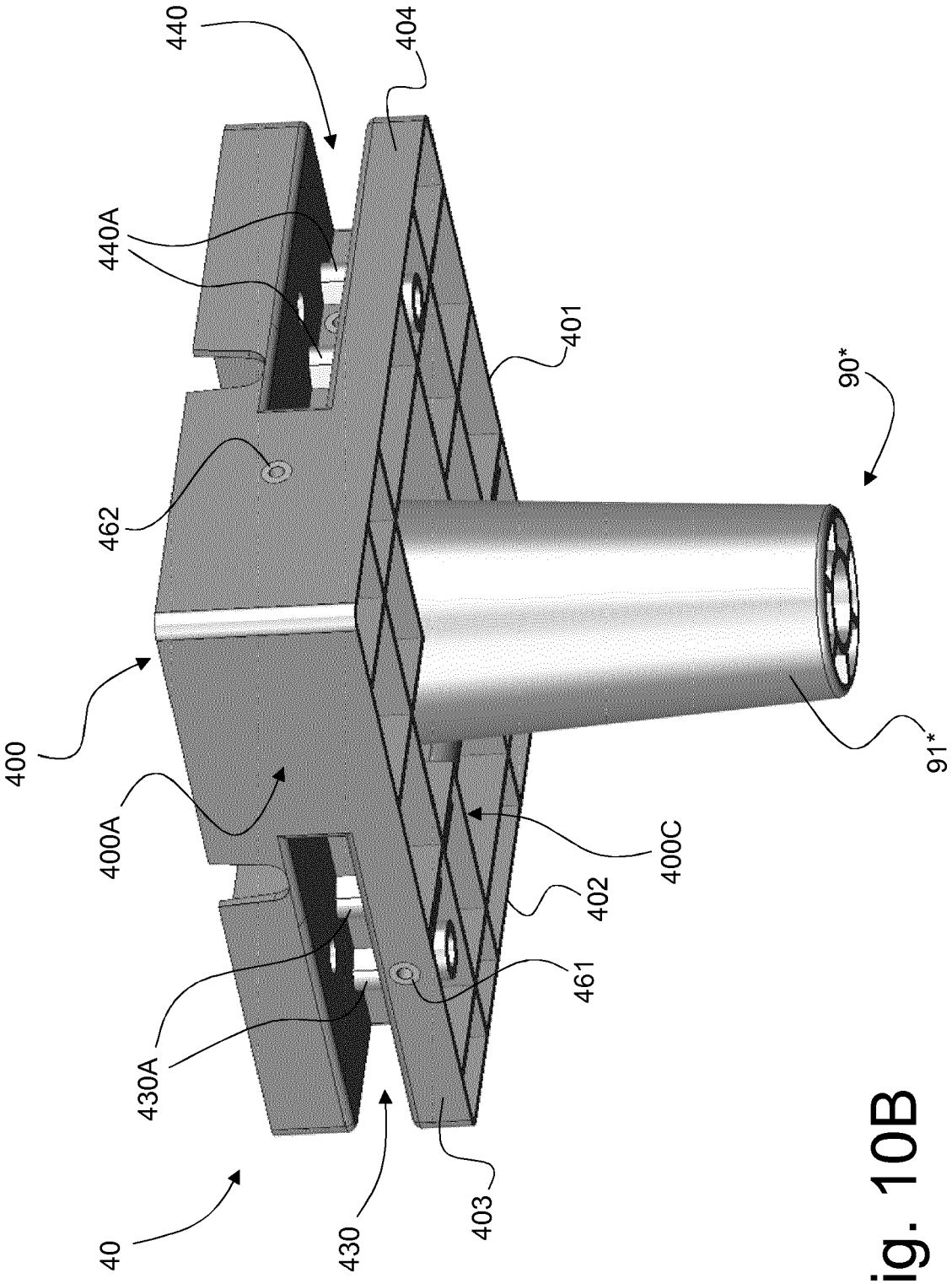

Fig. 10B

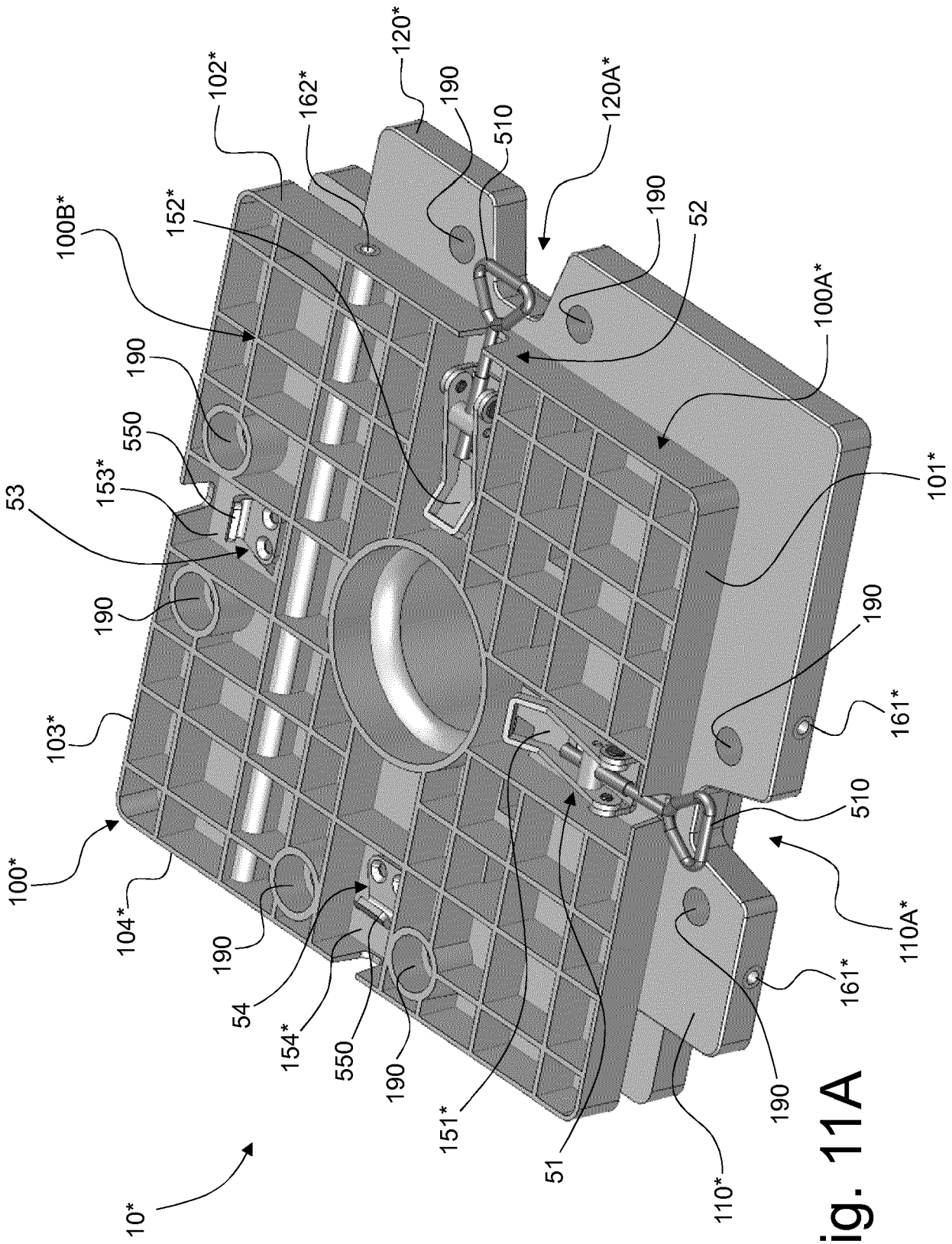
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Fig. 11A

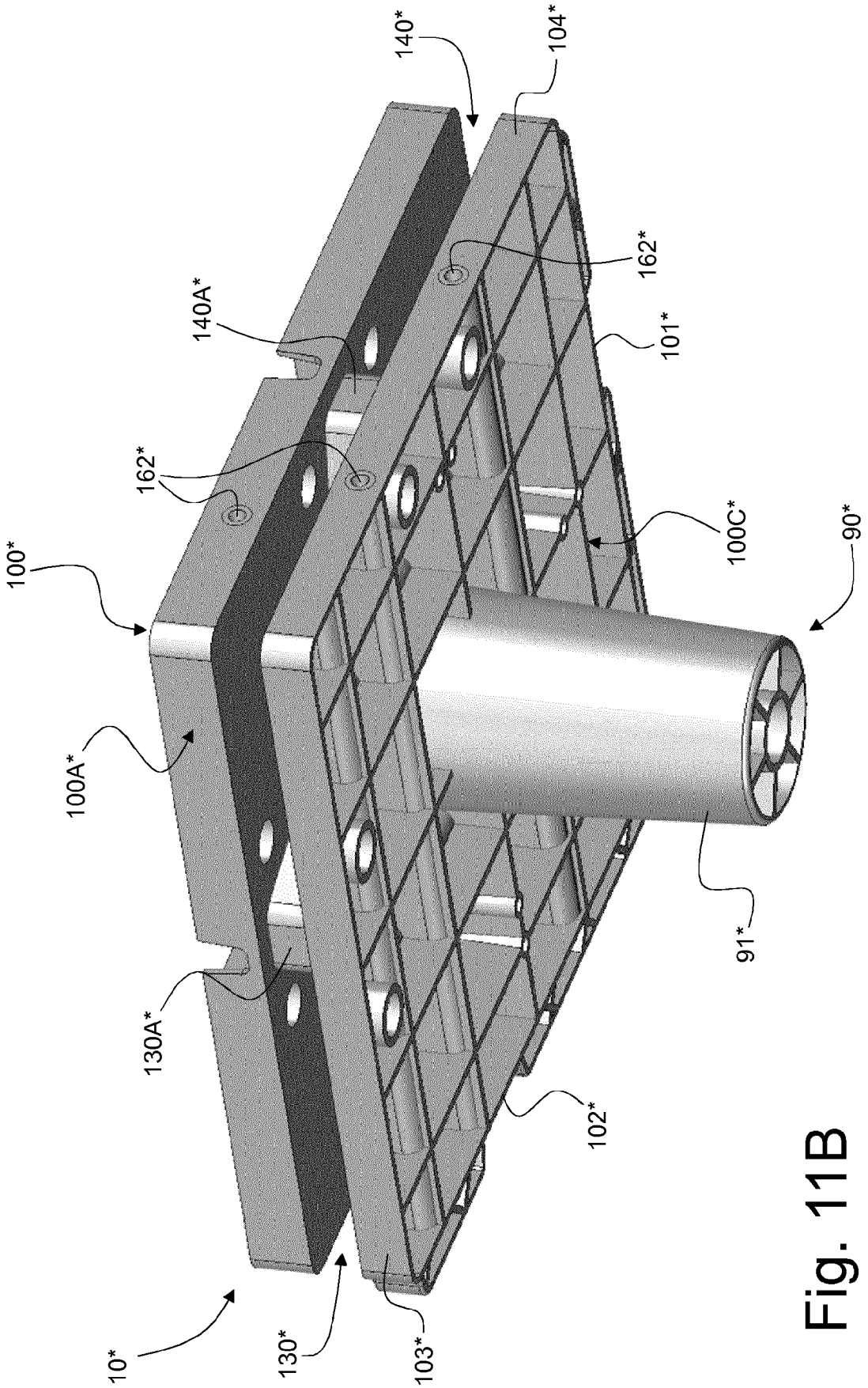

Fig. 11B

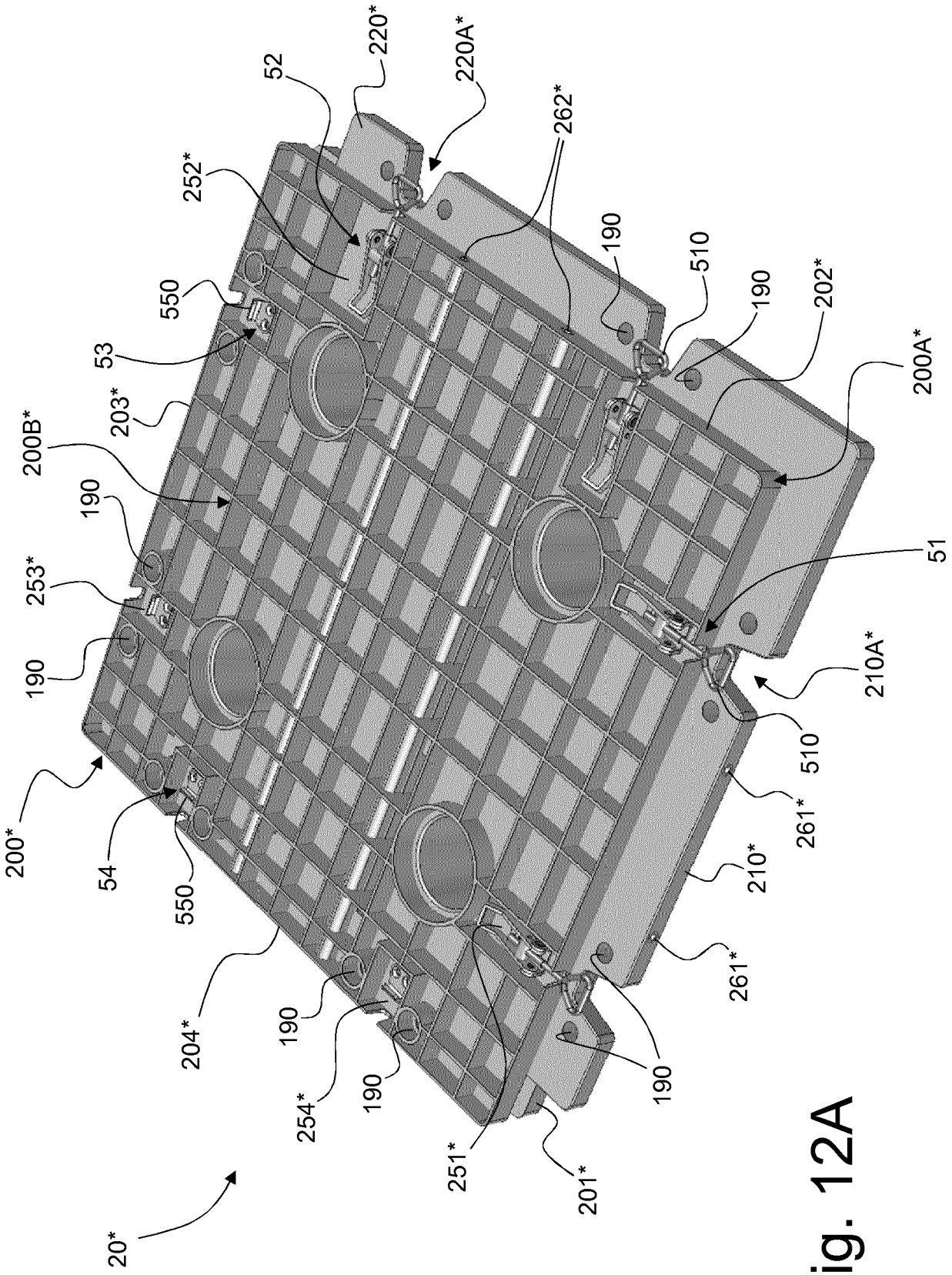
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Fig. 12A

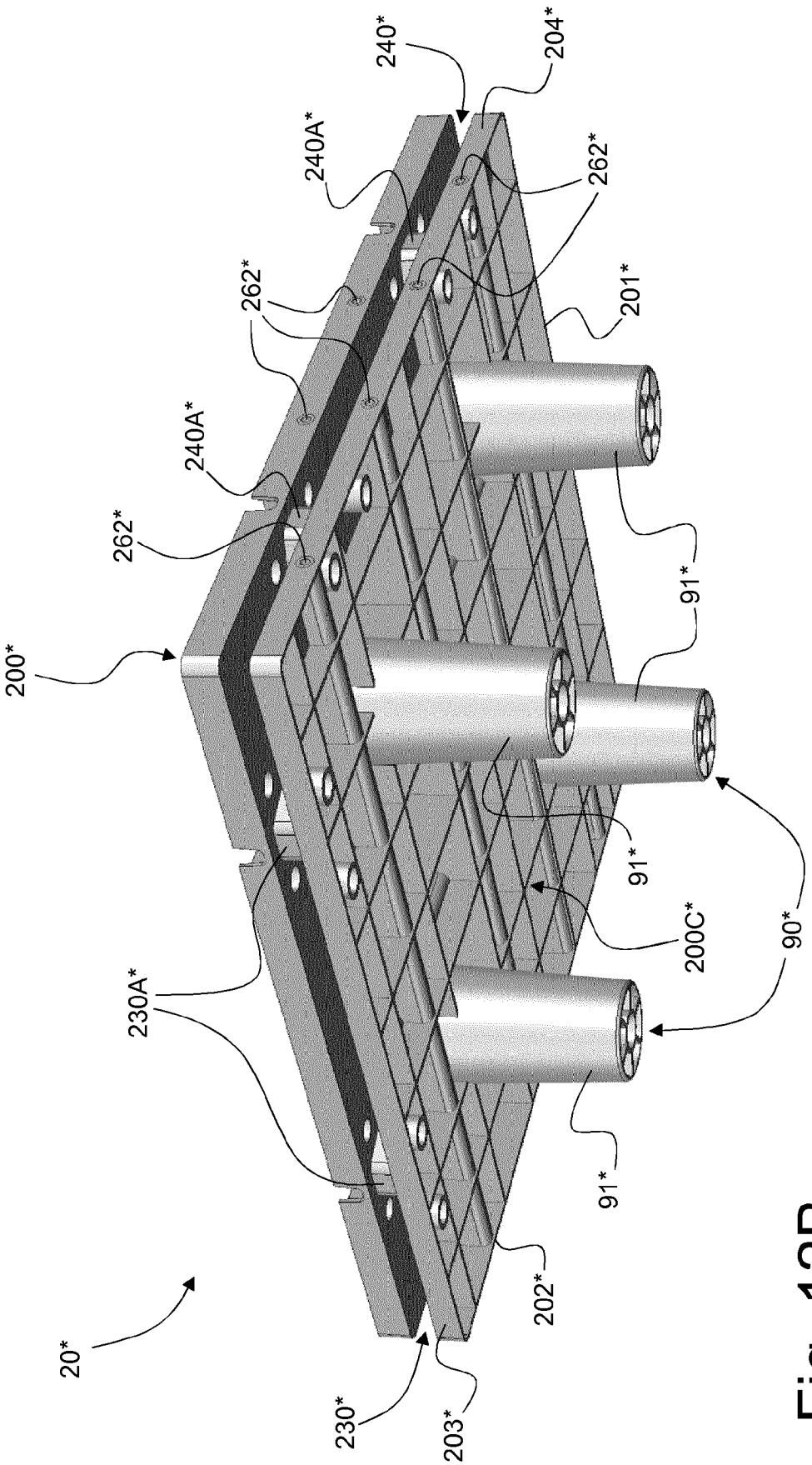
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Fig. 12B

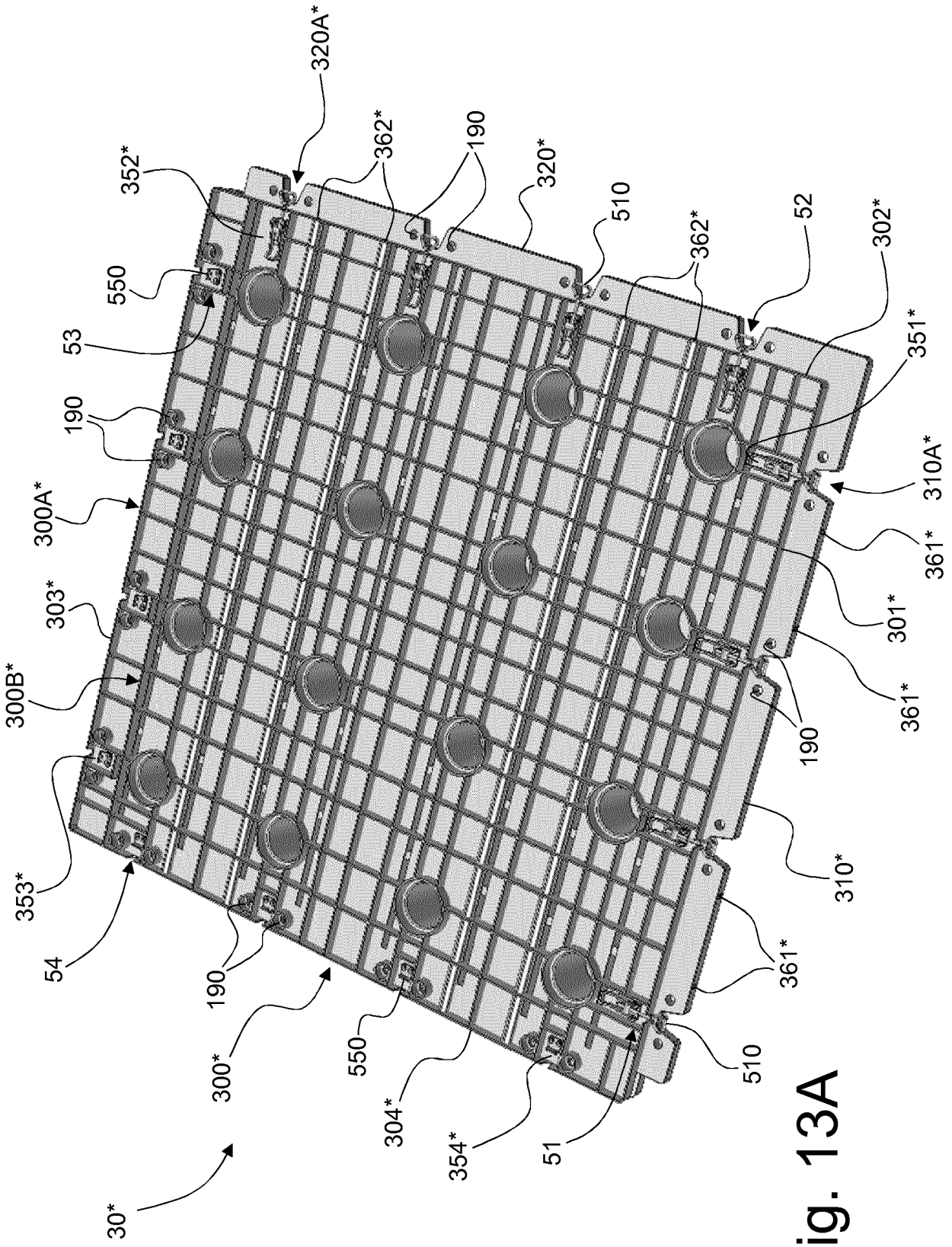
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Fig. 13A

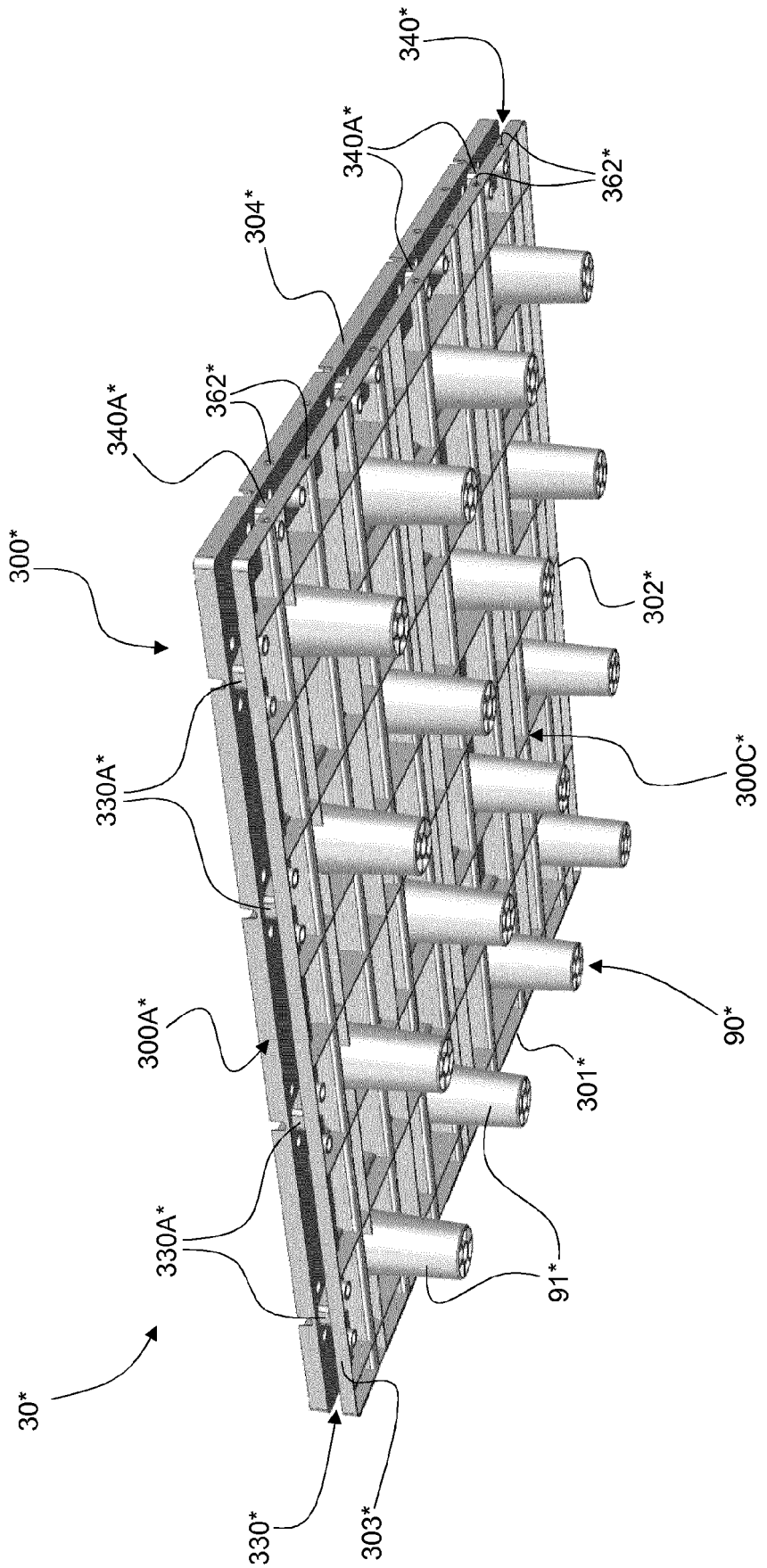
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Fig. 13B

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European Patent Office
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EUROPEAN SEARCH REPORT

Application Number
EP 19 15 0439

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	WO 98/31595 A1 (CODDINGTON LEIGH [AU]) 23 July 1998 (1998-07-23) * page 5, line 19 - page 9, line 12 * * figures 1-13 *	1-15	INV. B65D19/24 B65D19/32
A	CN 206 345 153 U (HUIZHOU ZHIXIANG LOGISTICS TECH CO LTD) 21 July 2017 (2017-07-21) * figures 1-5 *	1-15	
A	CN 205 023 079 U (PLA ORDNANCE ENGINEERING COLLEGE) 10 February 2016 (2016-02-10) * figures 1-9 *	1-15	
A	FR 2 157 171 A5 (BOURREAU ALAIN) 1 June 1973 (1973-06-01) * page 2, line 37 - page 4, line 28 * * figures 1-5 *	1-15	
A	CH 703 404 A2 (PITTET BERTRAND [CH]) 13 January 2012 (2012-01-13) * claim 1; figures 1-7 *	1-15	TECHNICAL FIELDS SEARCHED (IPC)
Y	US 2005/051061 A1 (SMITH PAUL [US]) 10 March 2005 (2005-03-10) * paragraph [0016] - paragraph [0029] * * figures 1-9 *	11,12, 14,15	B65D E04F
Y	CN 106 081 306 A (YIZHENG SHENGTAI ENV MAT CO LTD) 9 November 2016 (2016-11-09) * figures 1-3 *	11,12, 14,15	
Y	EP 3 075 922 A1 (ZHONG YUGANG [CN]) 5 October 2016 (2016-10-05) * paragraph [0017]; figures 1-5 *	14	

-/--

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	16 July 2019	Fitterer, Johann

CATEGORY OF CITED DOCUMENTS

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A : technological background
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D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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EUROPEAN SEARCH REPORT

Application Number
EP 19 15 0439

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	CN 109 051 191 A (NANJING CEC PANDA FPD TECH CO LTD ET AL.) 21 December 2018 (2018-12-21) * figures 1-14 * -----	1-15	
A	FR 2 859 458 A1 (KNAUF SNC [FR]) 11 March 2005 (2005-03-11) * page 5, line 31 - page 10, line 36 * * figures 1-10 * -----	1-15	

TECHNICAL FIELDS SEARCHED (IPC)

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	16 July 2019	Fitterer, Johann

CATEGORY OF CITED DOCUMENTS

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D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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Application Number
EP 19 15 0439

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

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LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 19 15 0439

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-10(completely); 12-15(partially)

   Pallet module comprising a main structural body, a mating system and a foot structure, the pallet module further comprising toggle latch components for interlocking similar pallet modules.

   ---

2. claims: 11(completely); 12-15(partially)

   Pallet module comprising a main structural body, a mating system and a foot structure, wherein the foot structure is a releasable structure comprising a spring-loaded locking mechanism.

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 19 15 0439

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16-07-2019

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EPO FORM P0459

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