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(51) INT CL:
B65D 19/38 (2006.01)

(56) Documents Cited:
WO 2003/059786 A1 **US 5806863 A**
US 1924824 A
https://en.wikipedia.org/w/index.php?title=Latch_(hardware)&oldid=722898355
JPH0966939
KR20130054058

(58) Field of Search:
INT CL **B65D**
Other: **WPI, EPODOC**

(54) Title of the Invention: **Pallet attachment**
Abstract Title: **A latch to project down from a pallet**

(57) A latch 252 can extend down from a pallet 46 or a bracket attachable to a pallet so that it projects below the base of the pallet and would engage racking 230, tines or other discontinuous surfaces. This engagement could help prevent the pallets sliding off support surfaces. The latches can be biased to extend down but be urged back up to above the level of the pallets base when the pallet rests on a flat surface. Ideally the vertical movement is achieved by a hinge or pivot, possibly in the form of projections slidably engaging an elongate arctuate slot so that there is no axel at the axis or rotation. There can be a spring bias to urge the latch downwards.

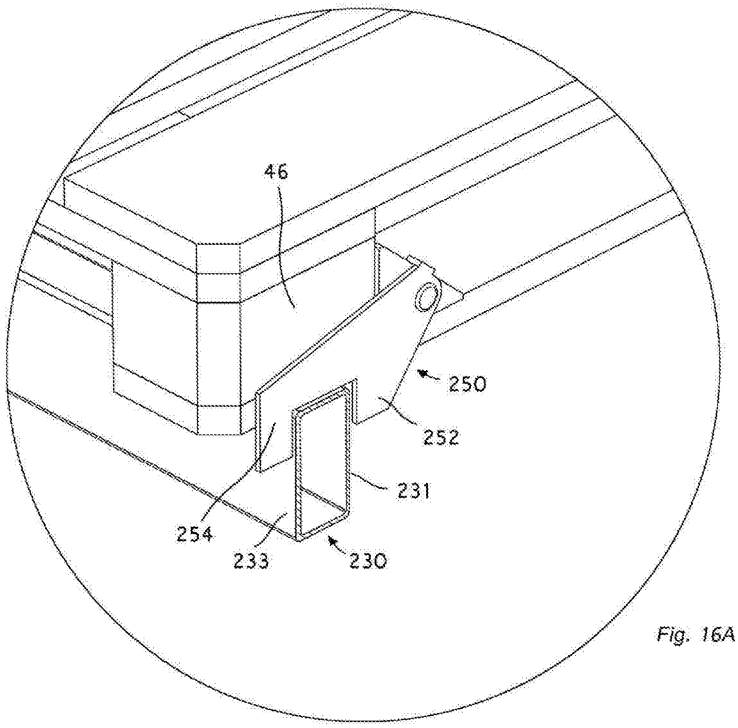

Fig. 16A

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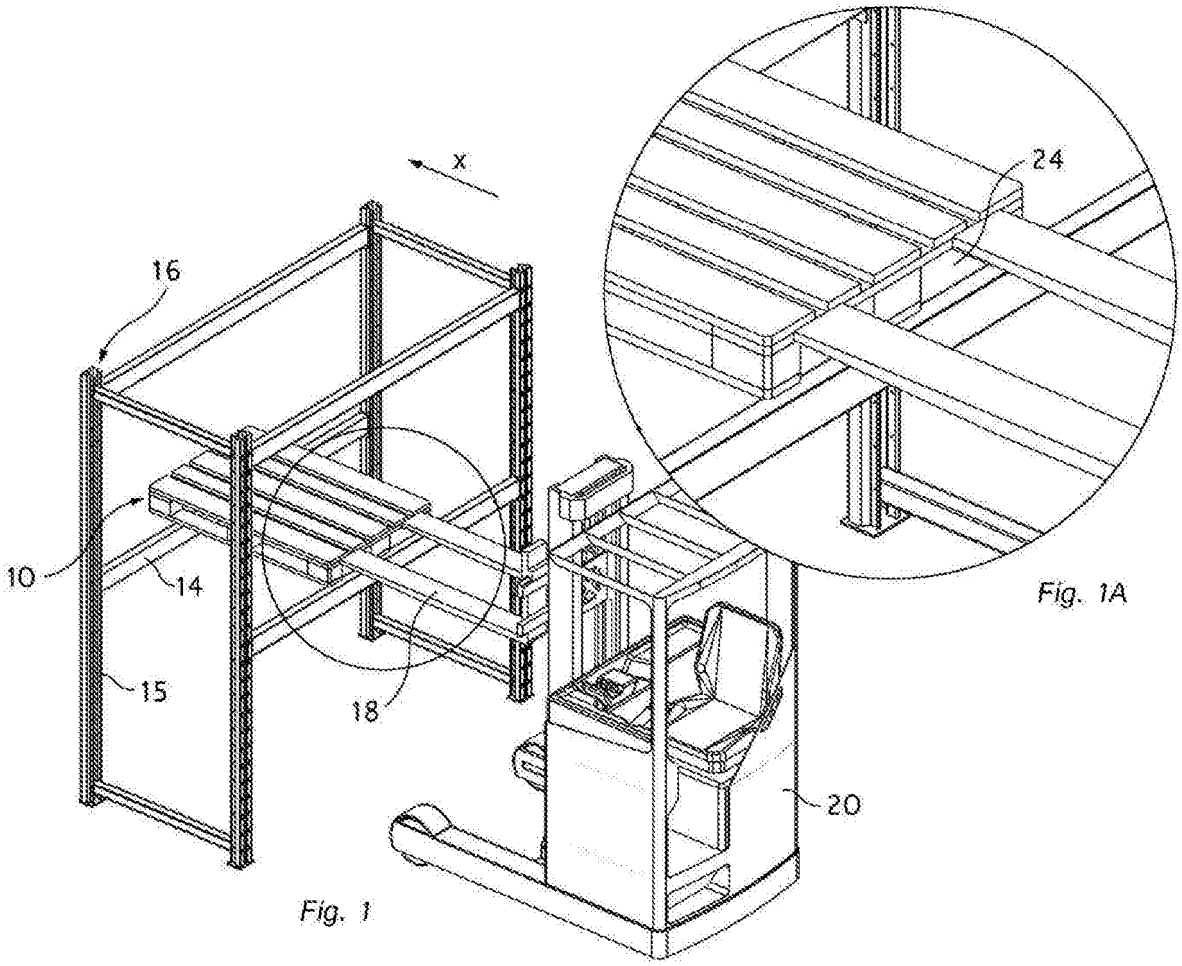


Fig. 1A

Fig. 1

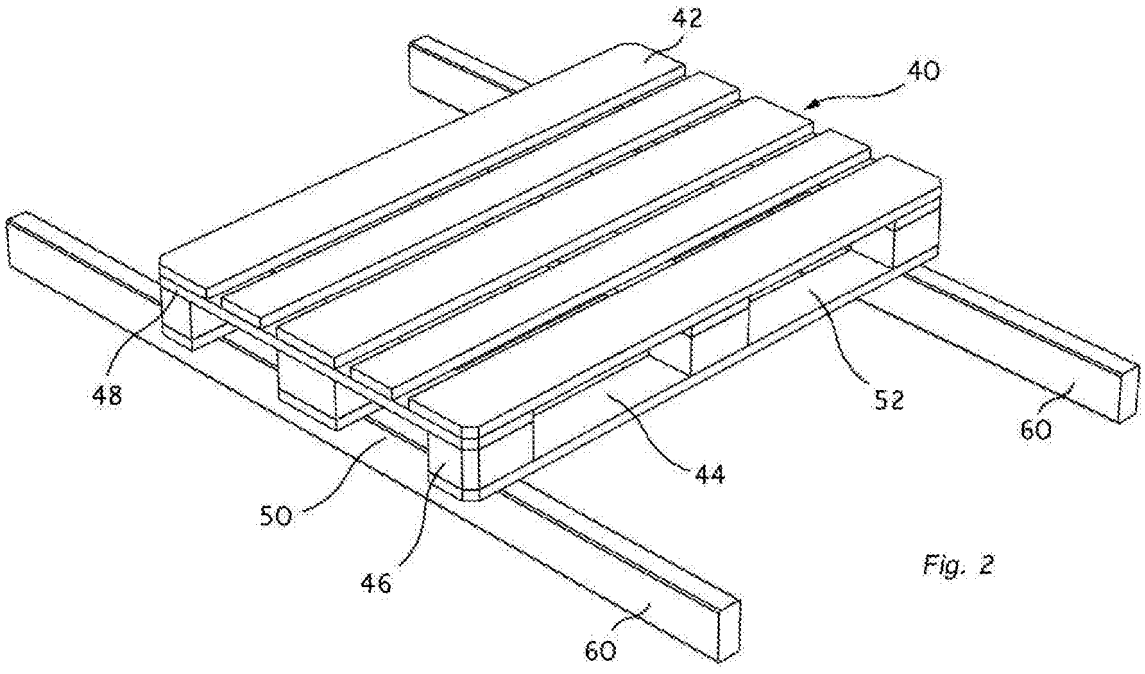
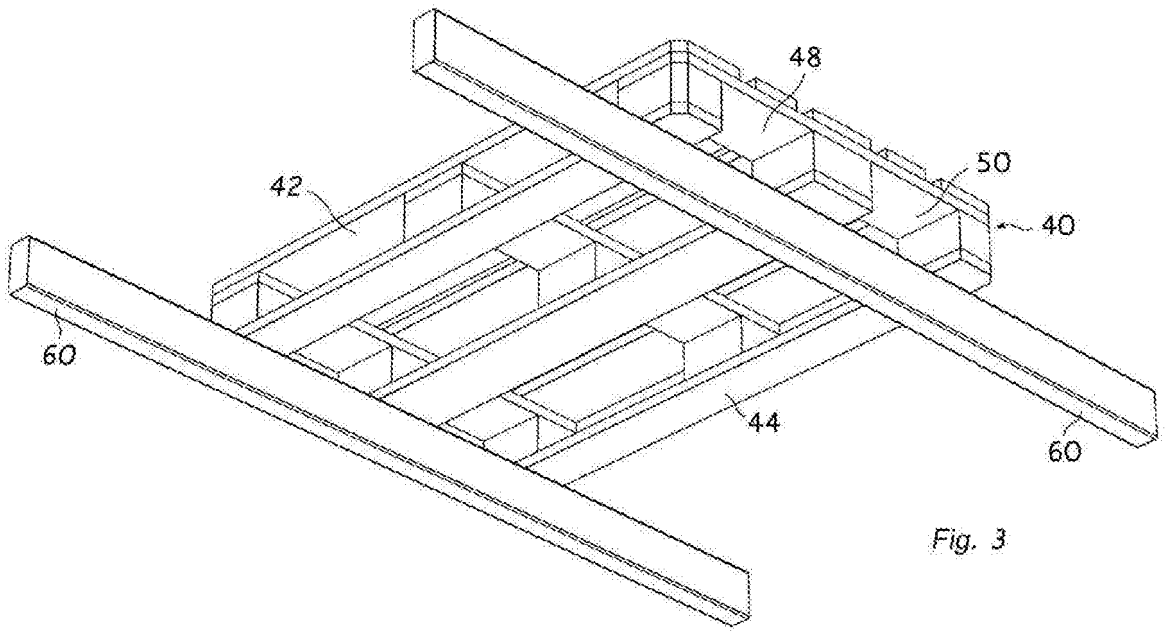


Fig. 2



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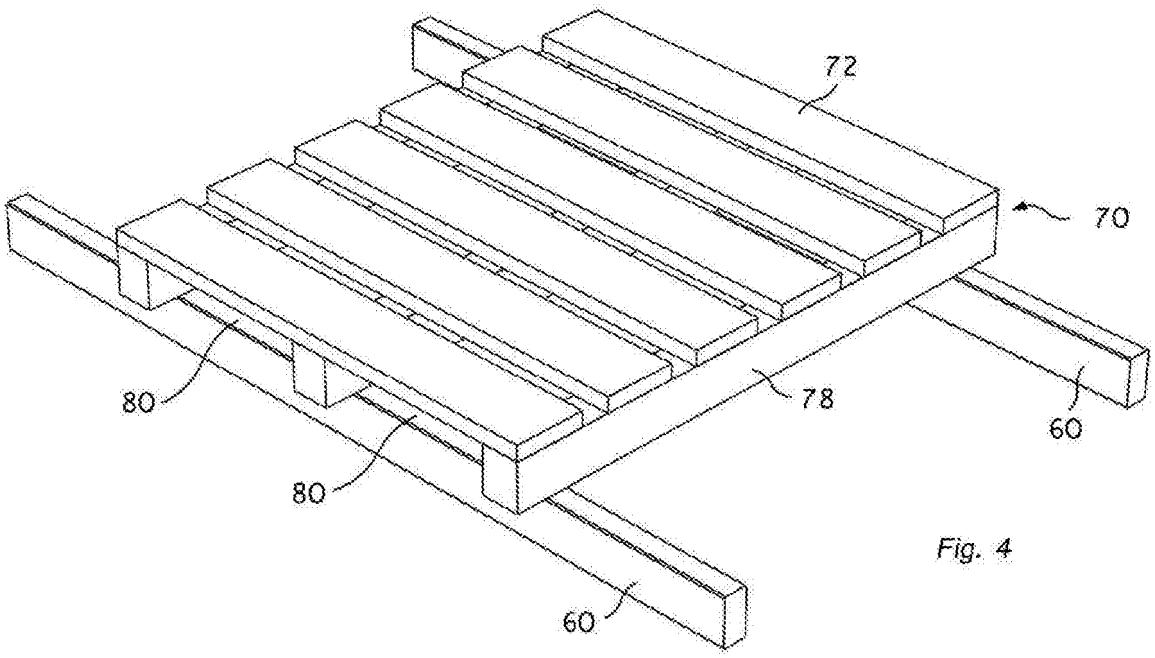

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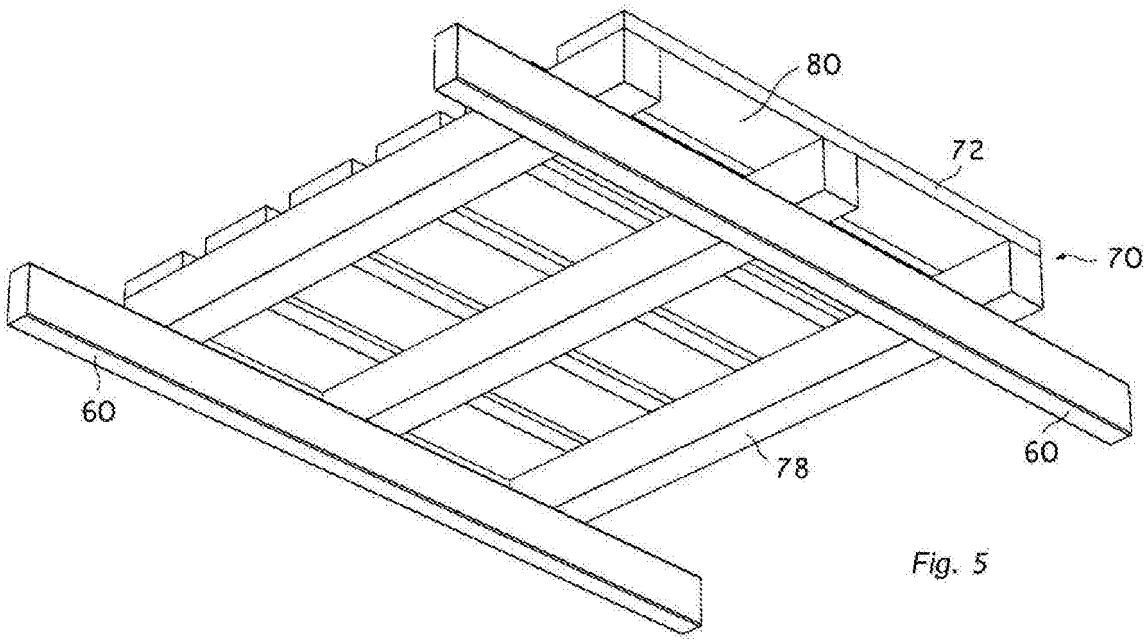

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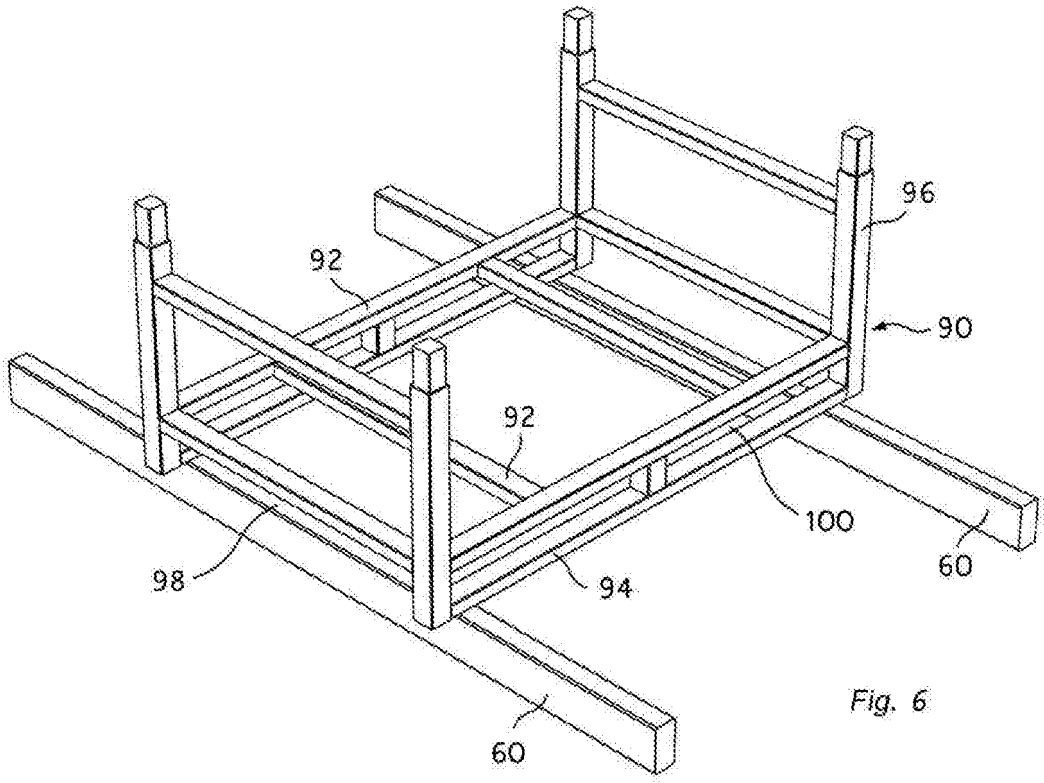

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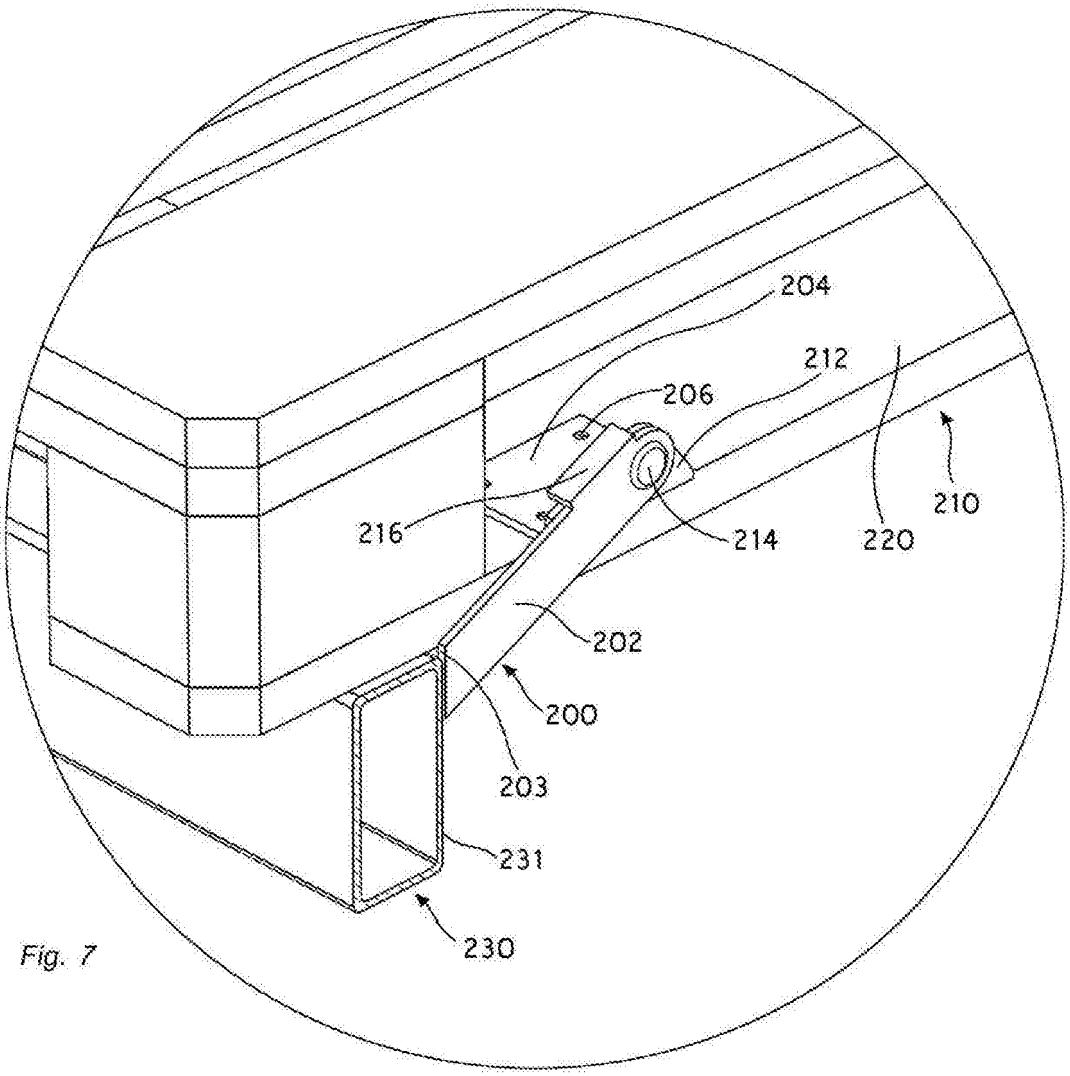

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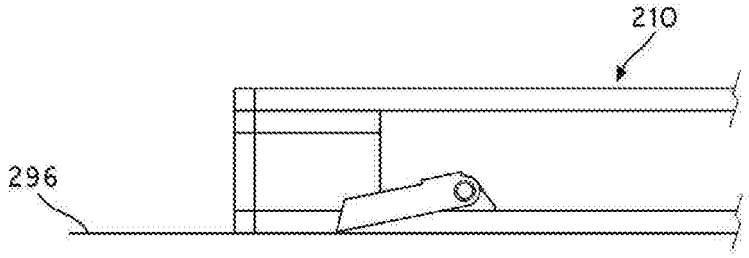

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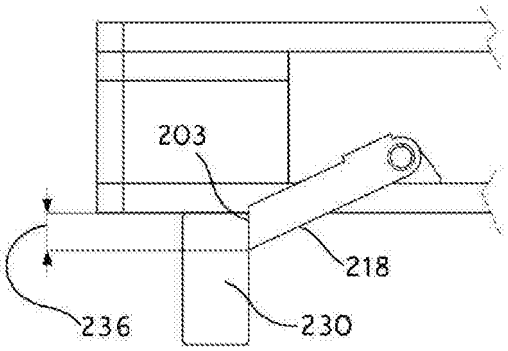

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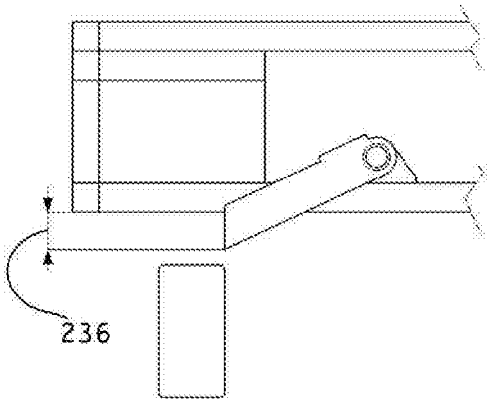

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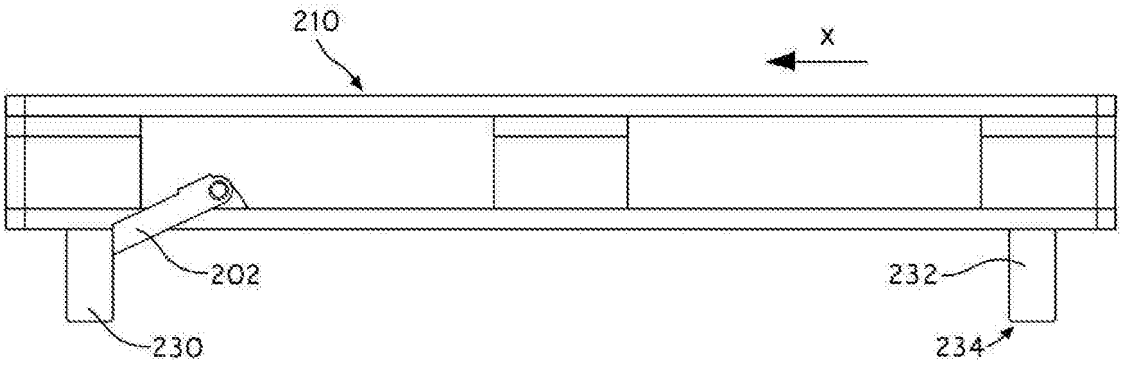

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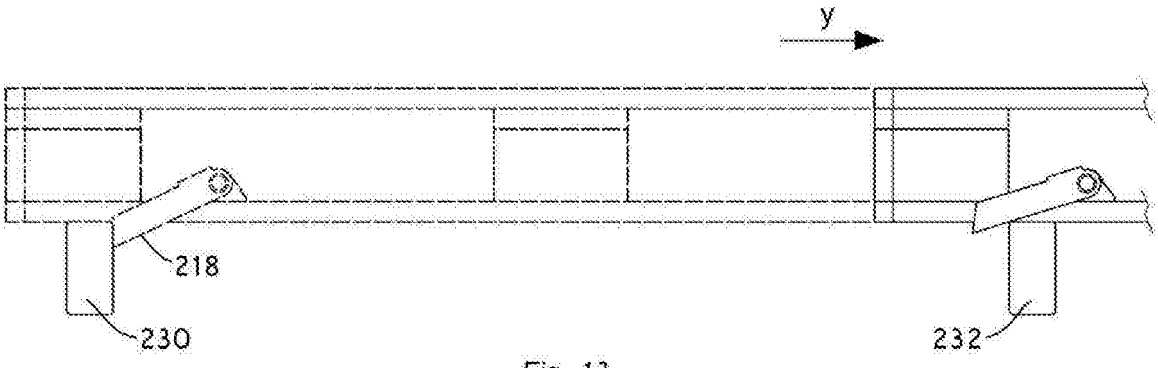

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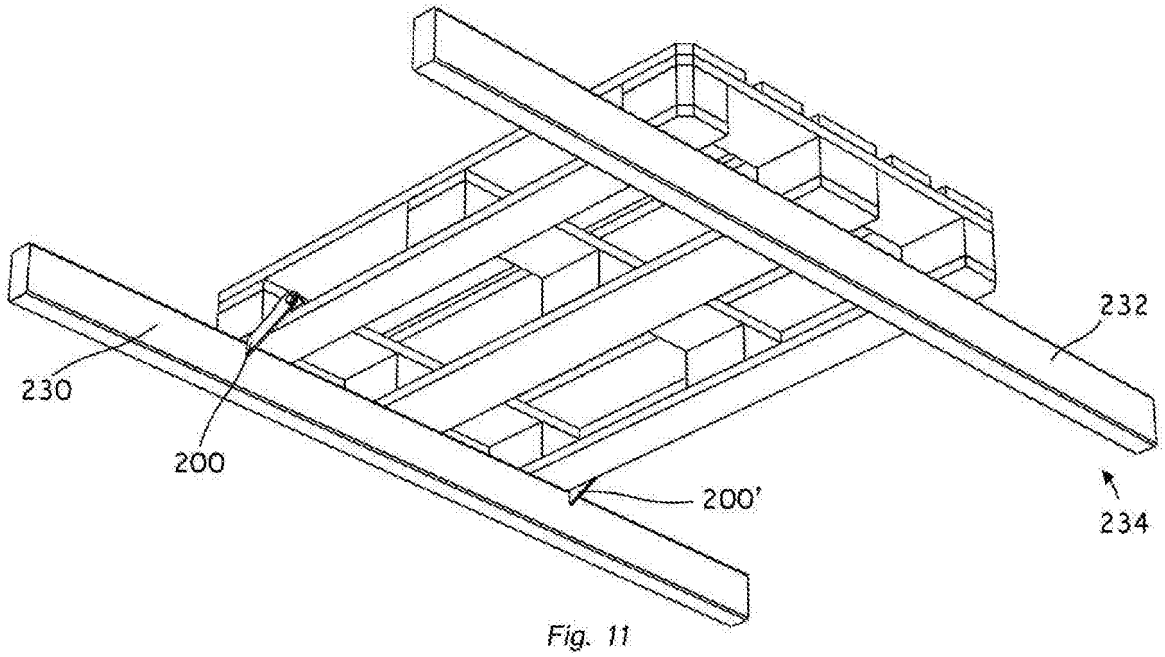

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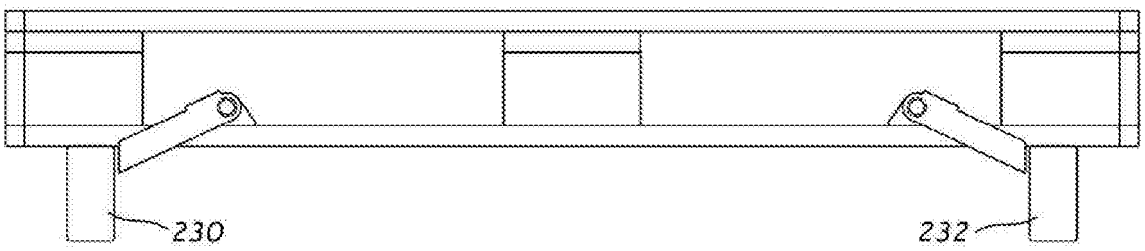

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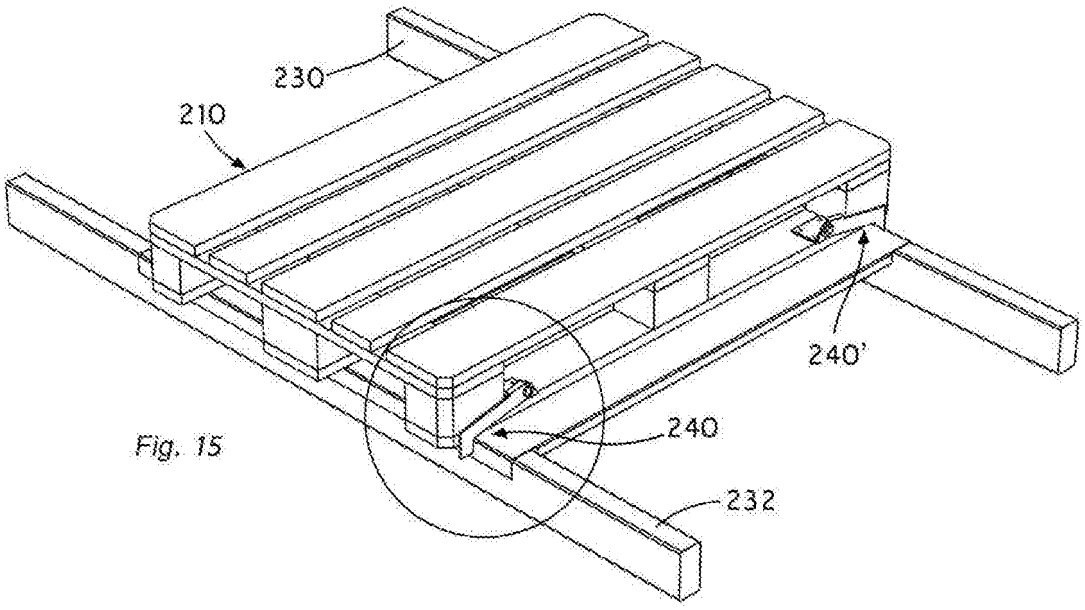

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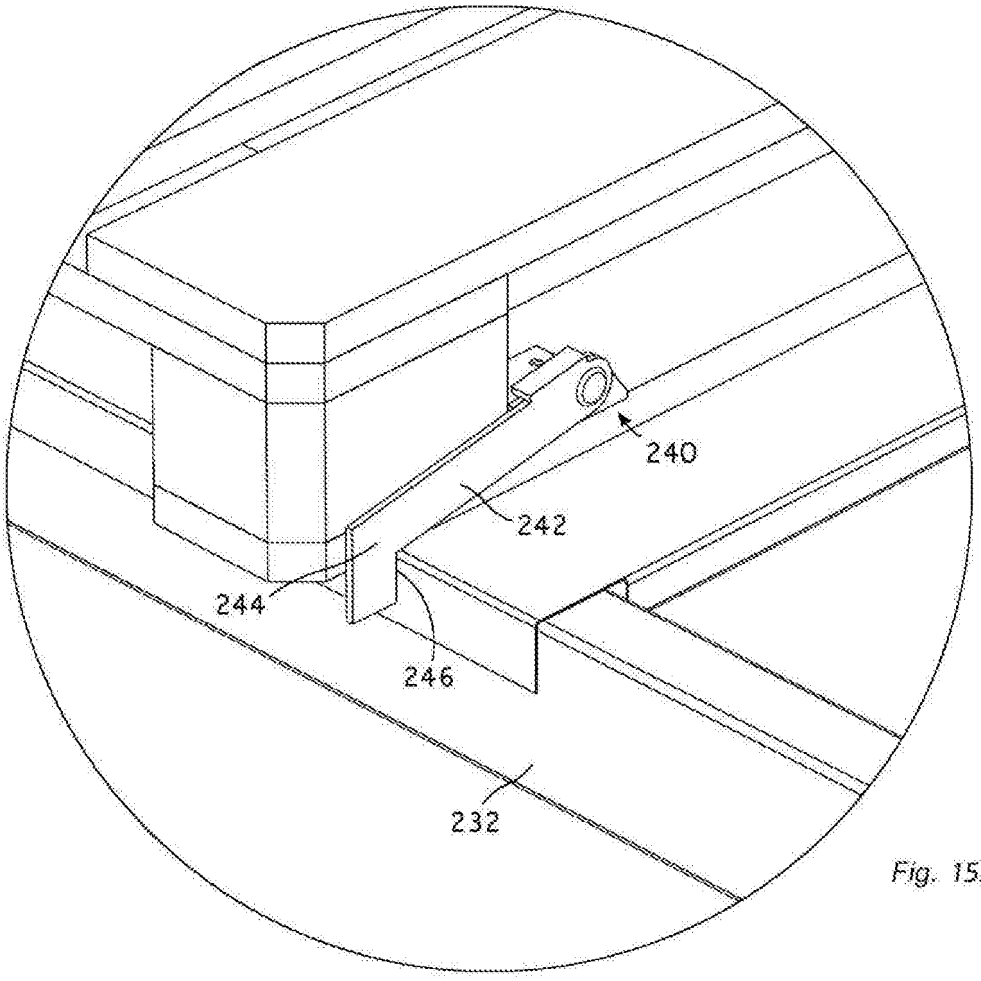

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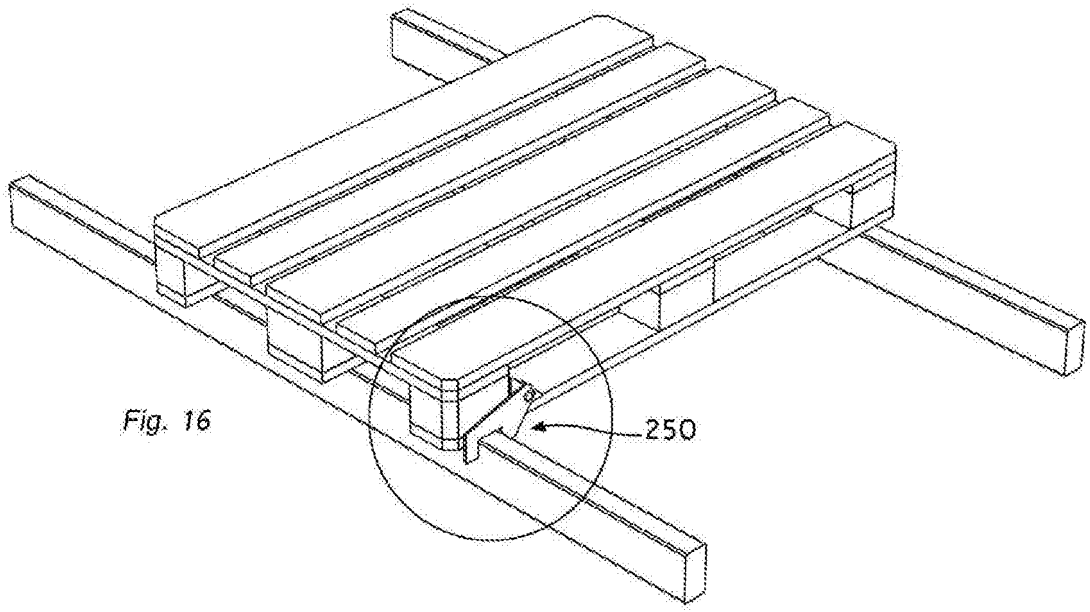

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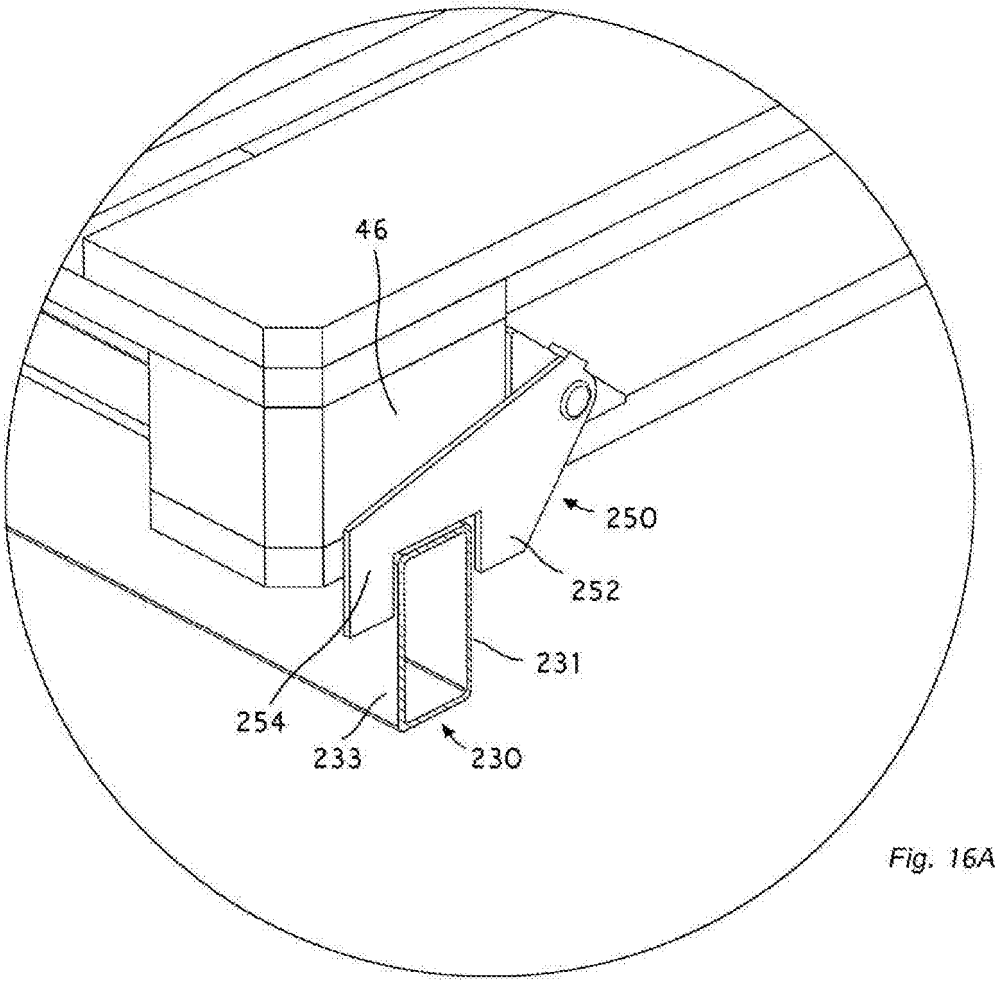

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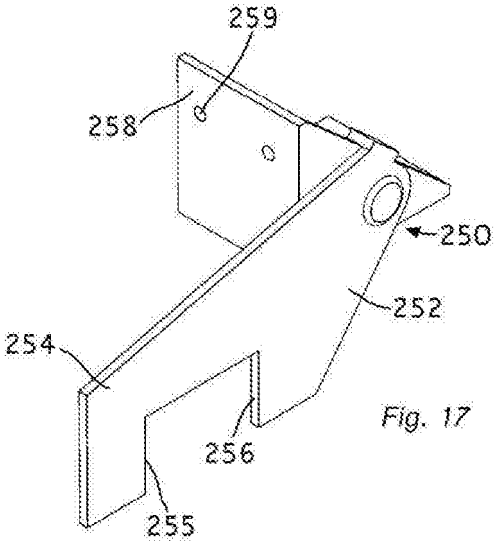

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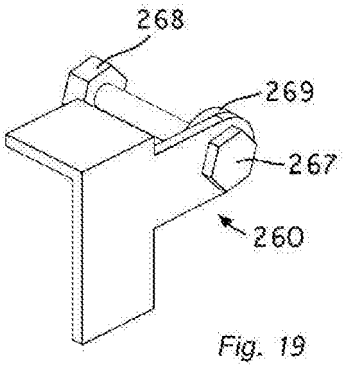

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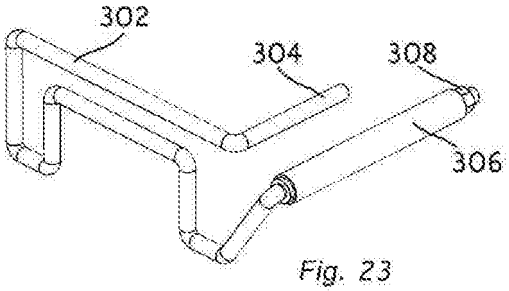

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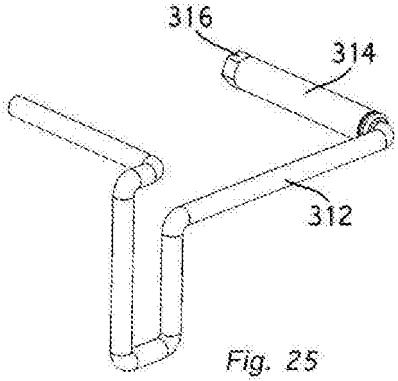

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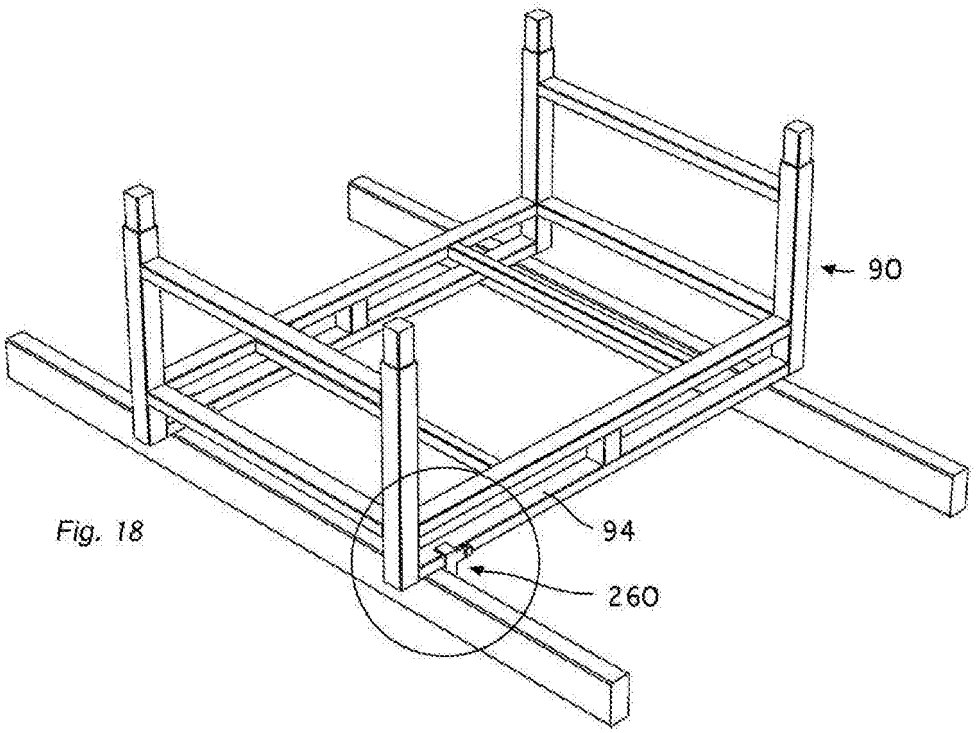

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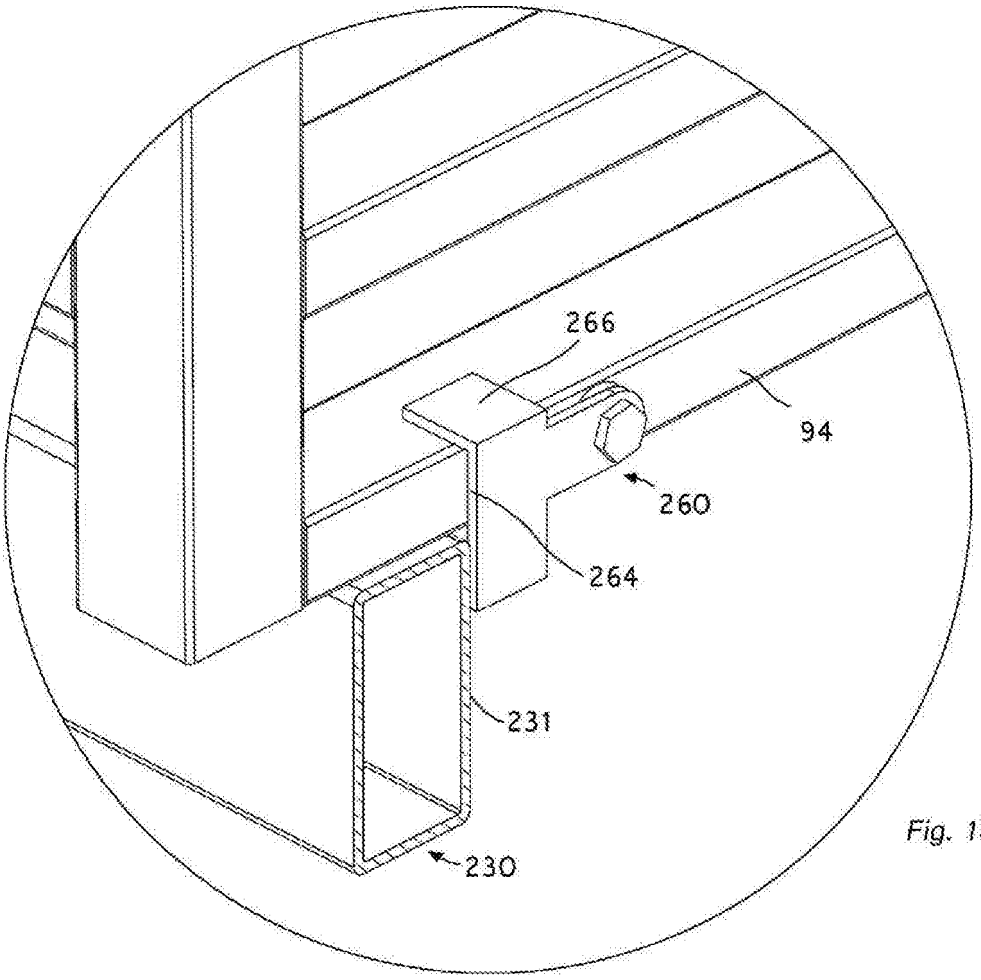

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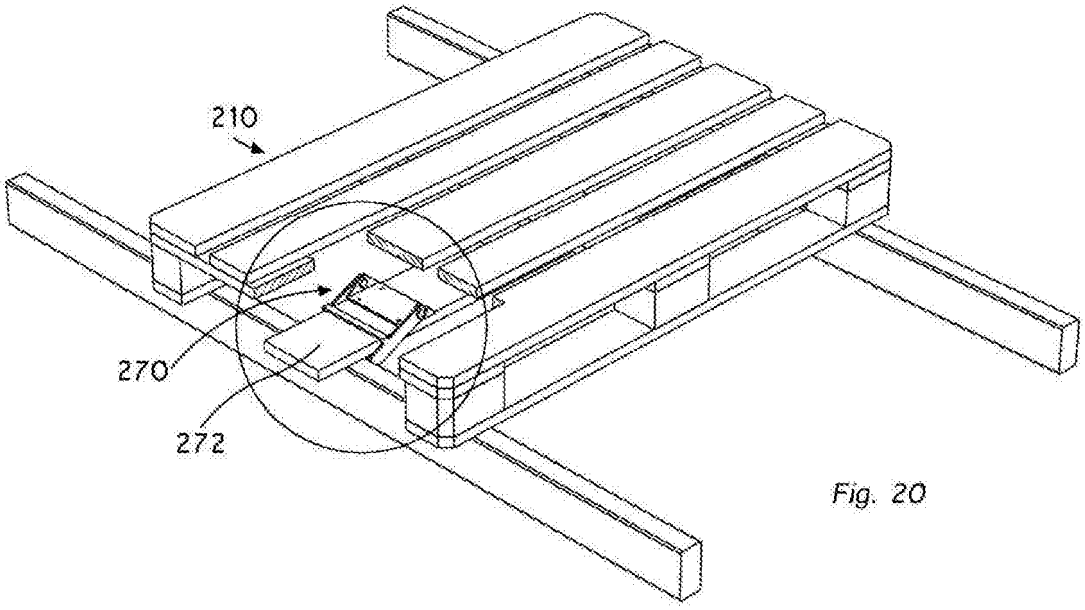

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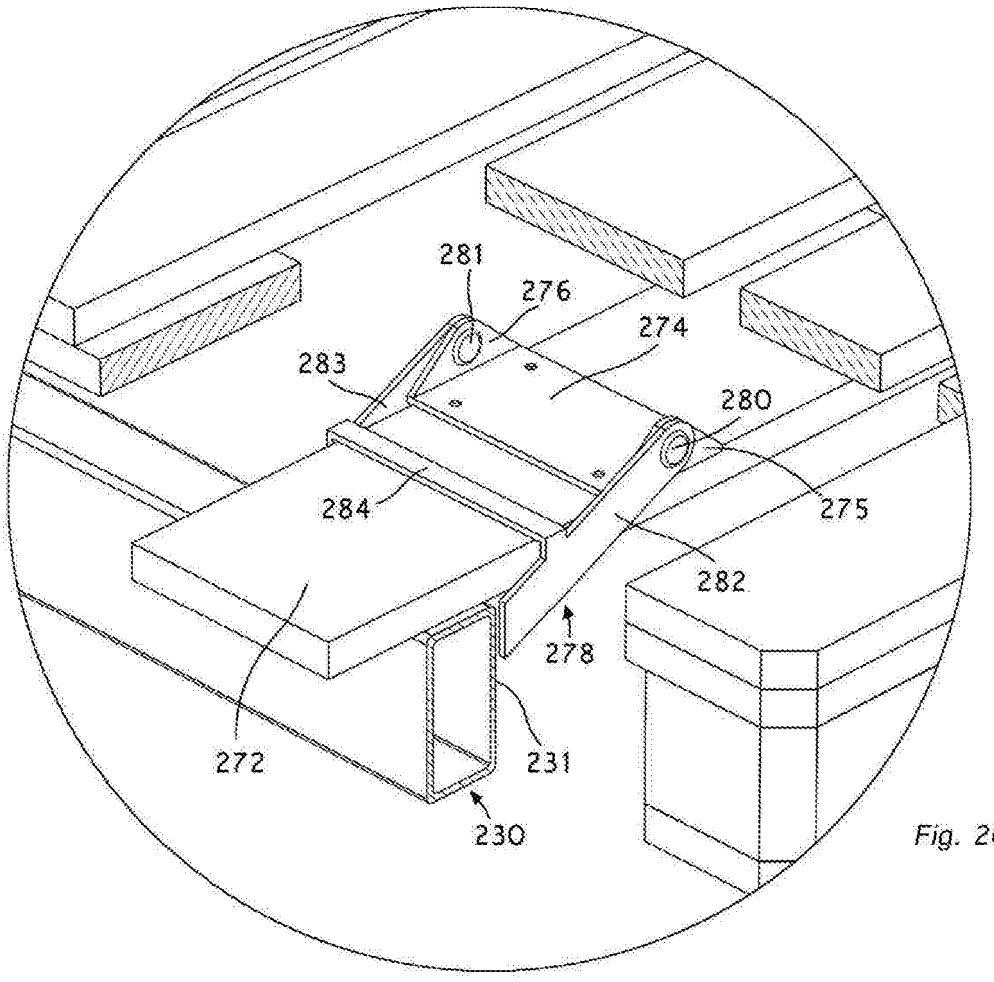

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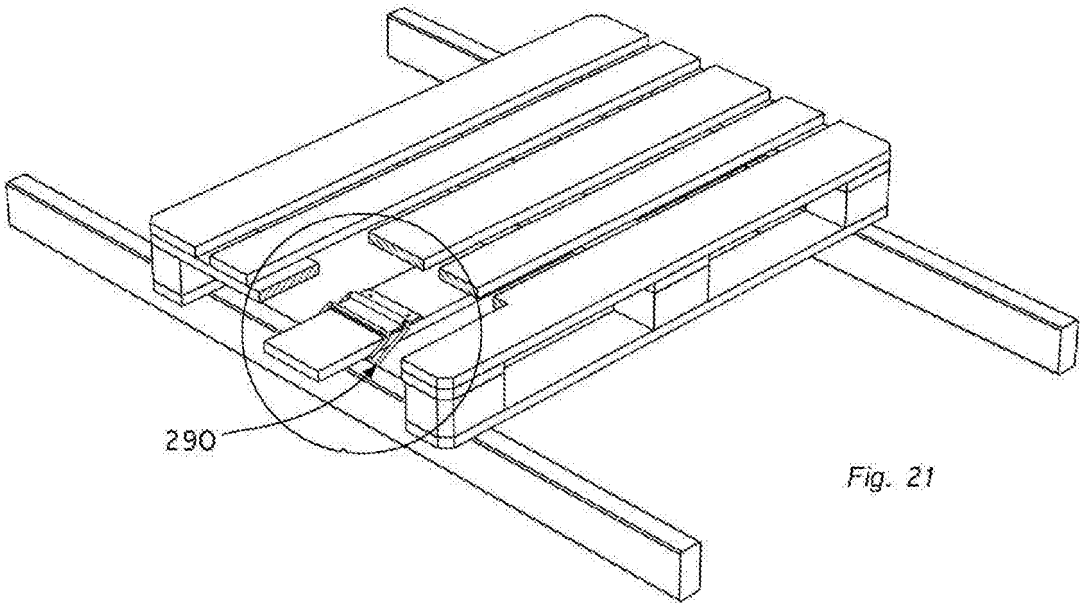

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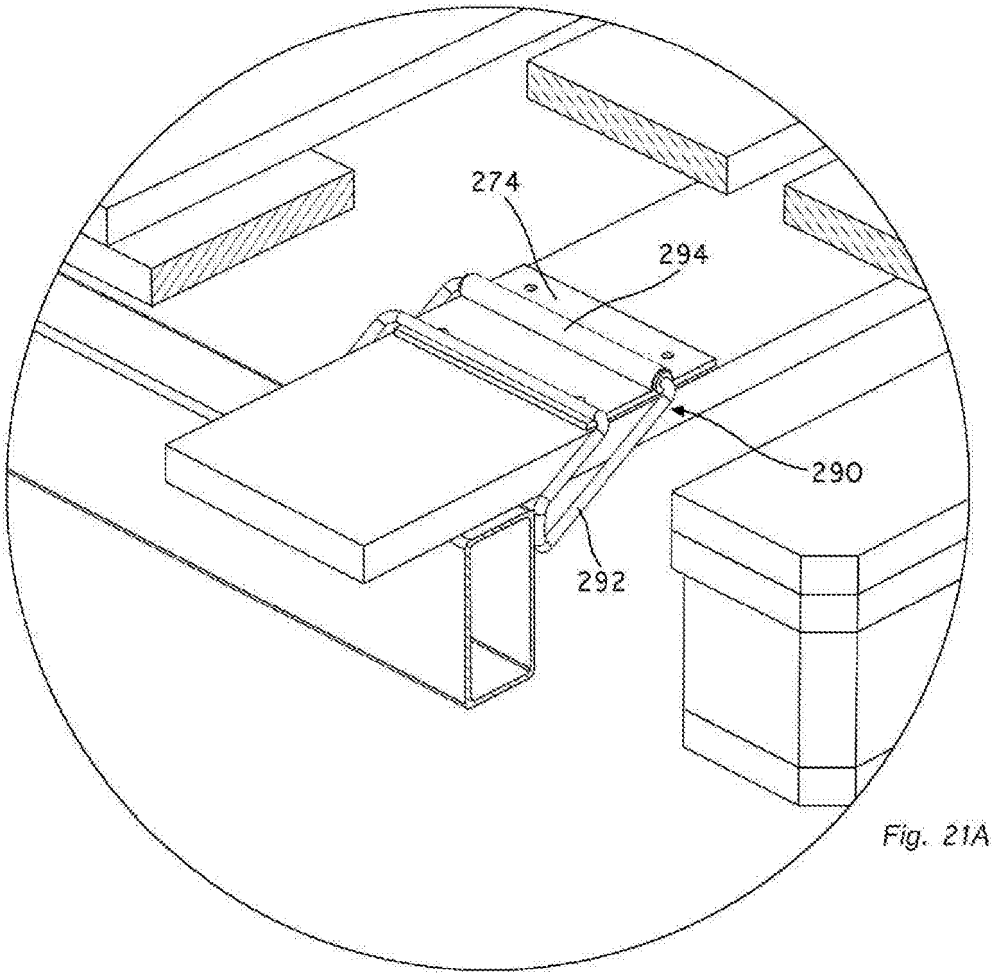

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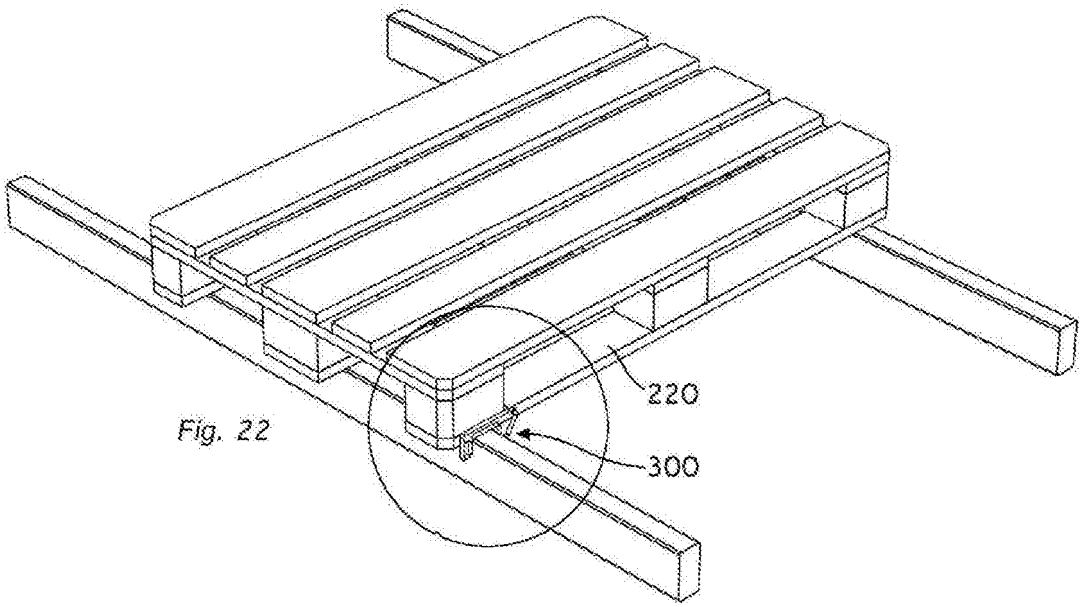

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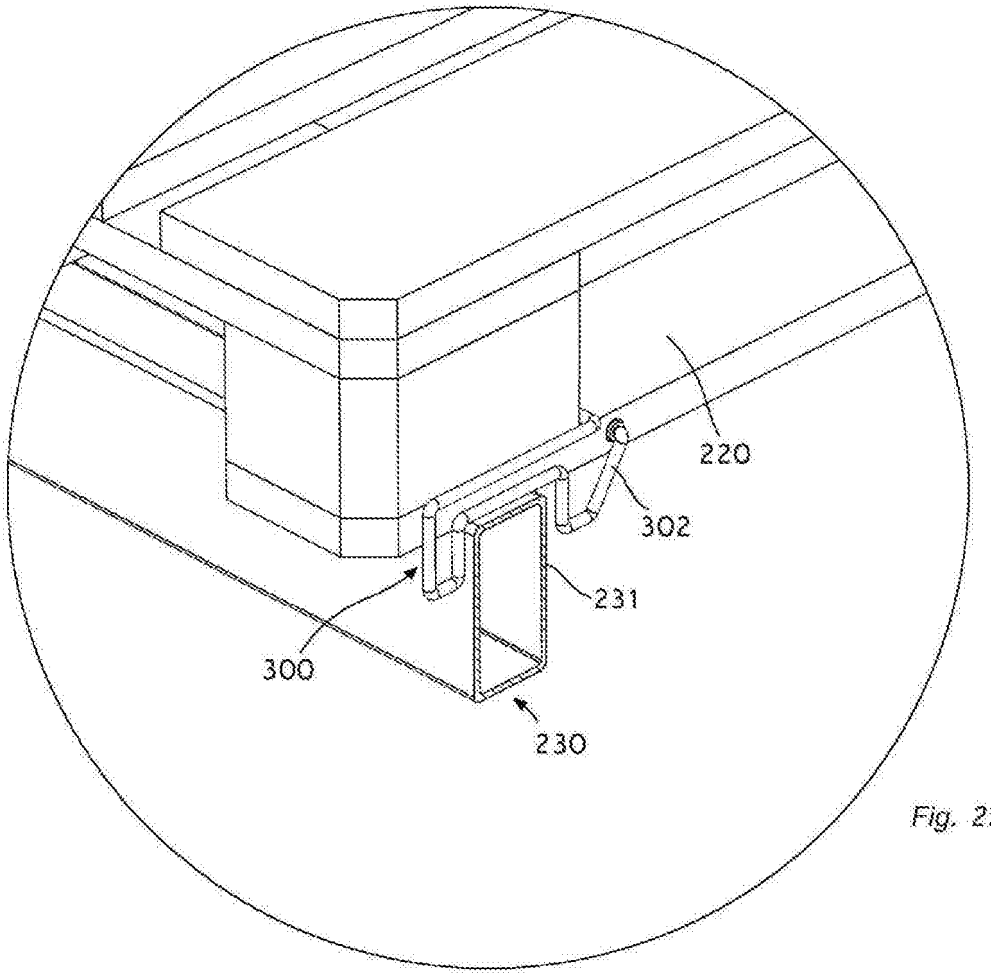

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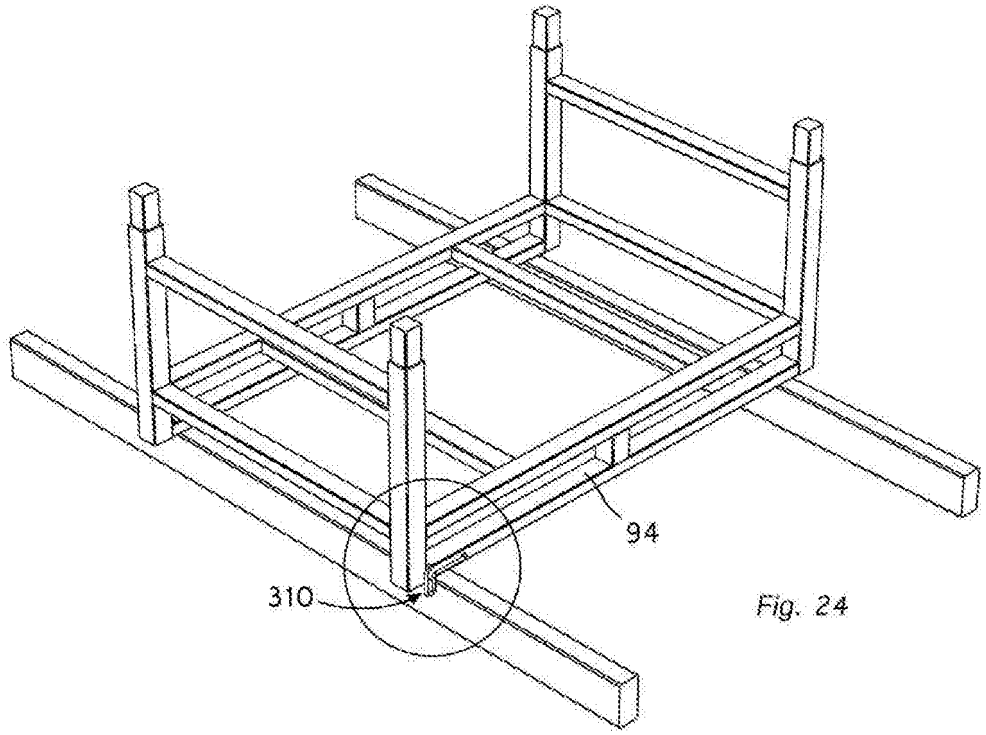

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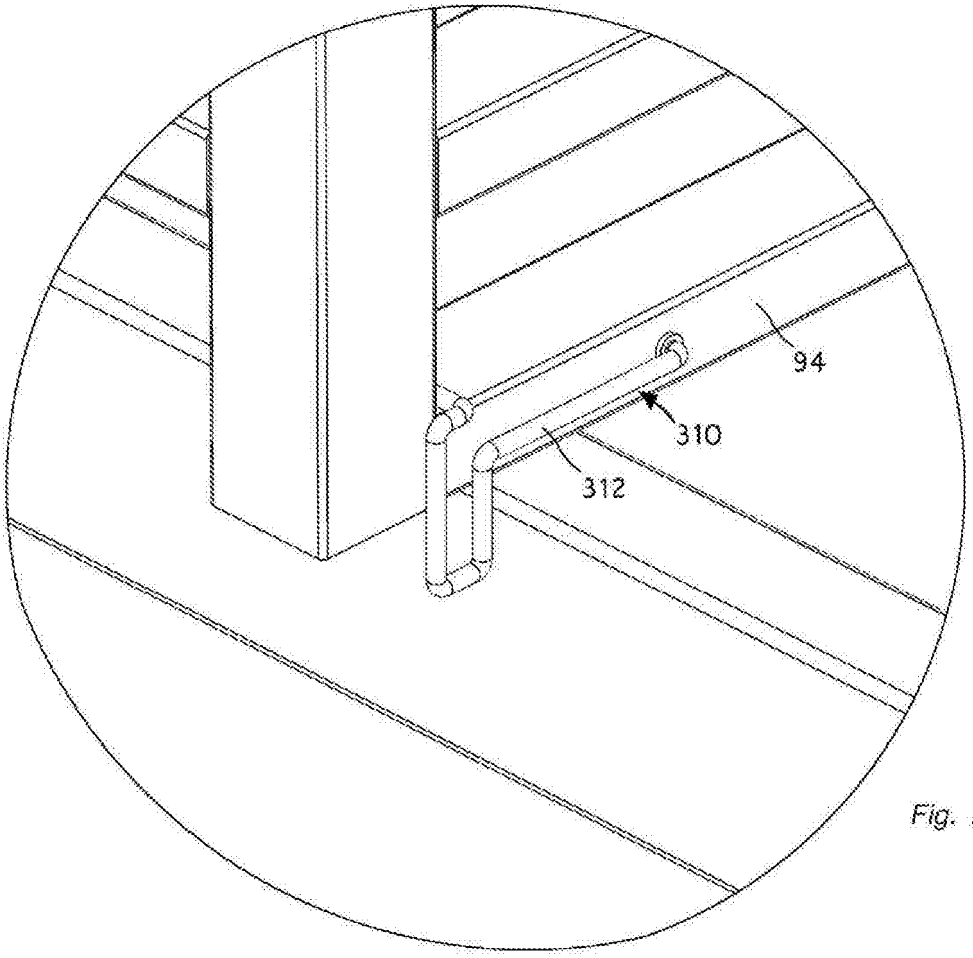

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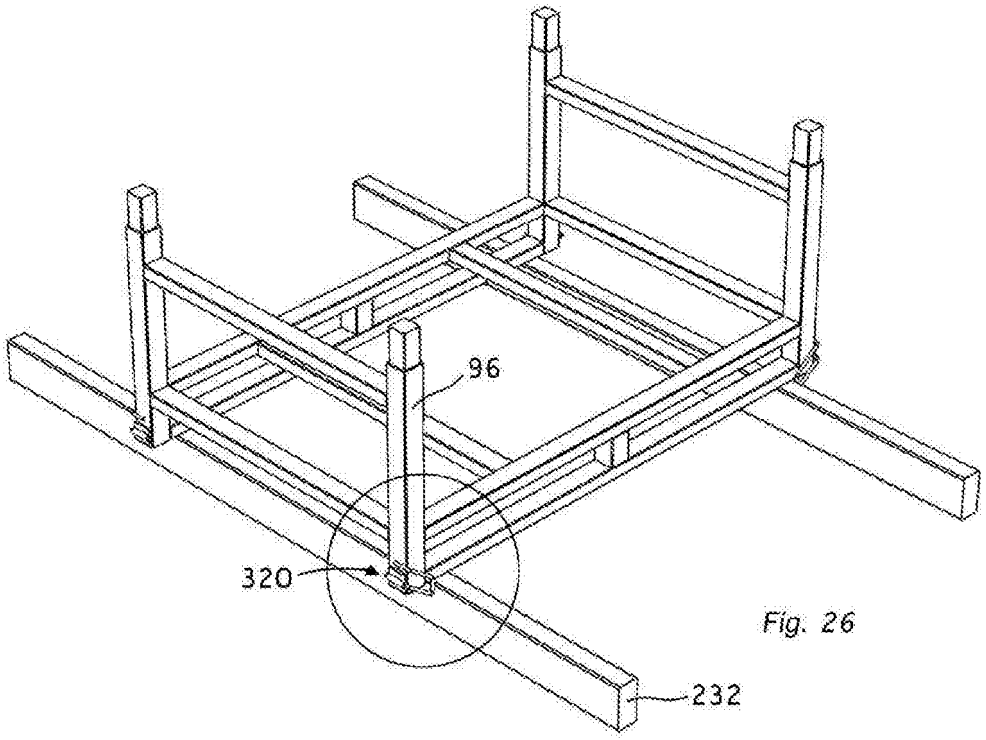

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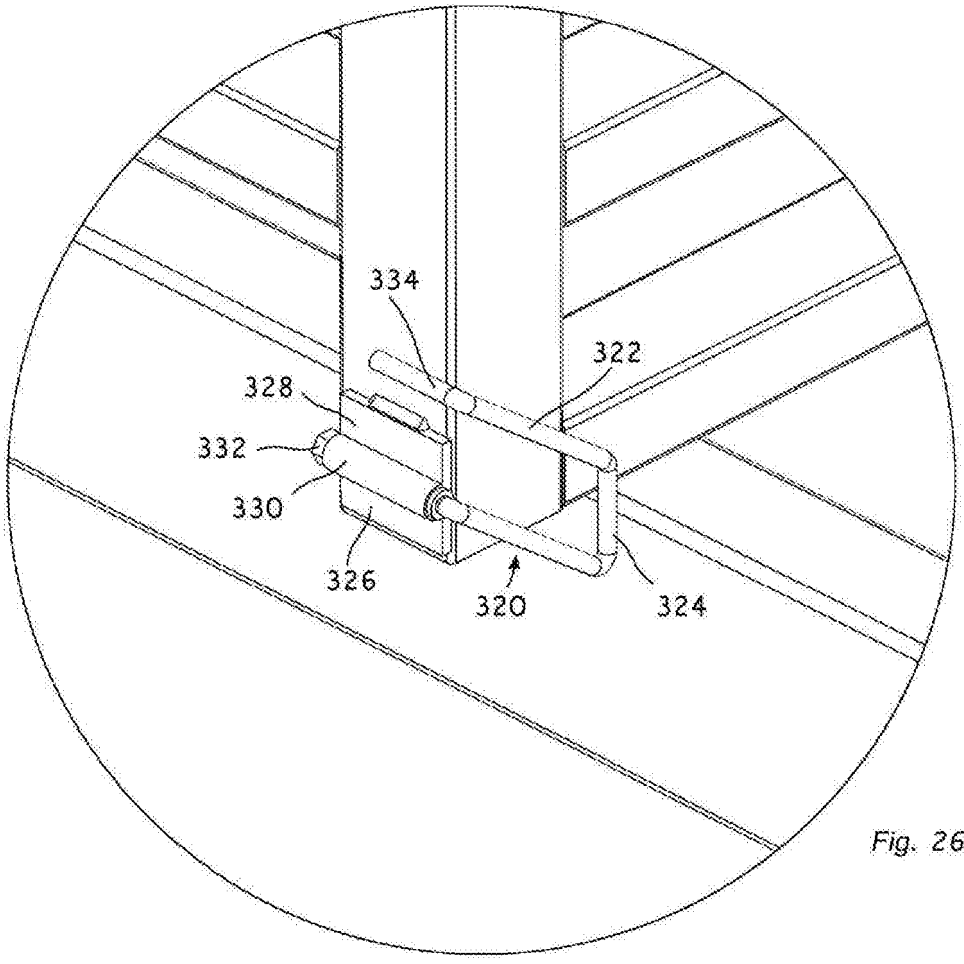

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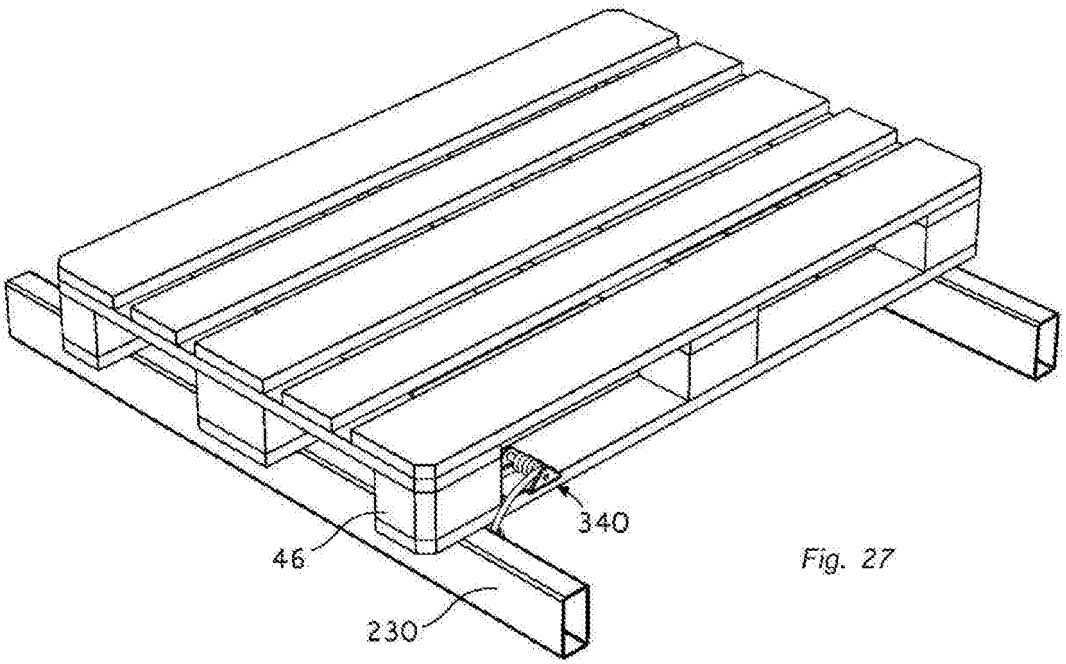

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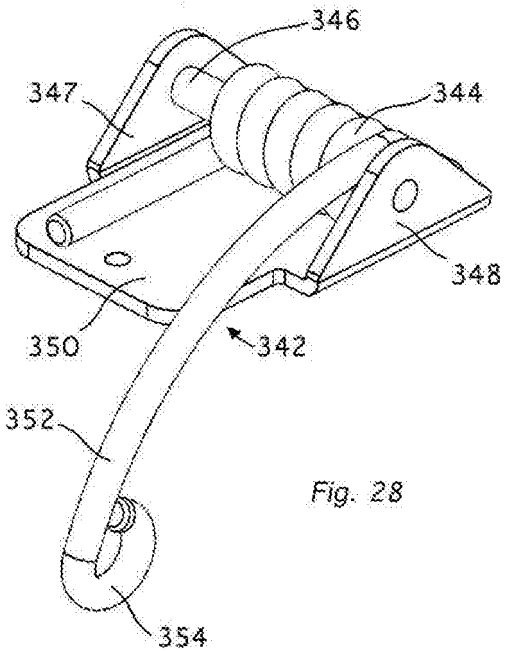

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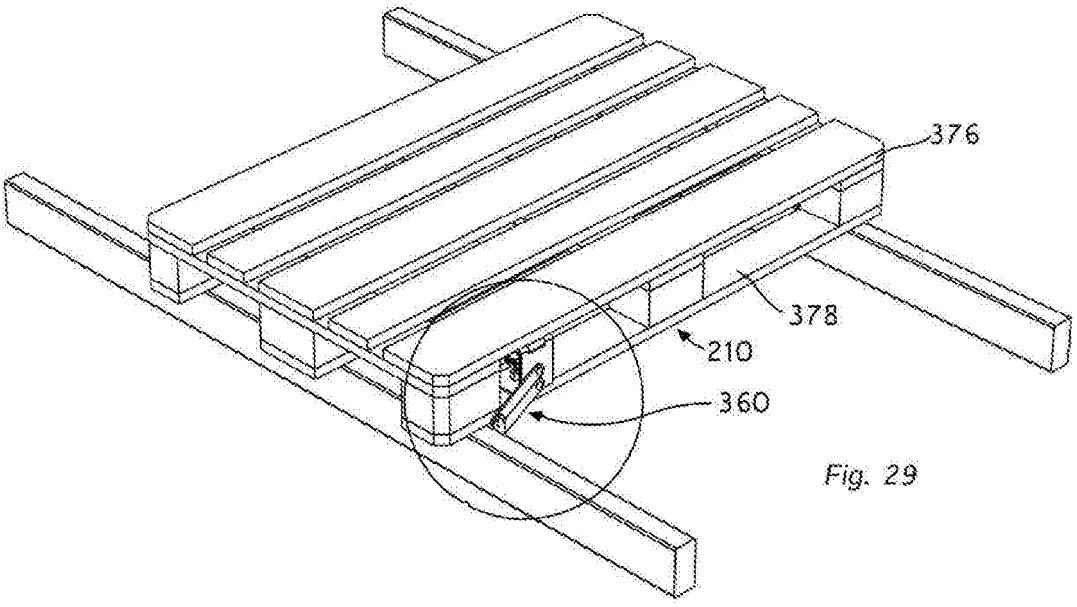

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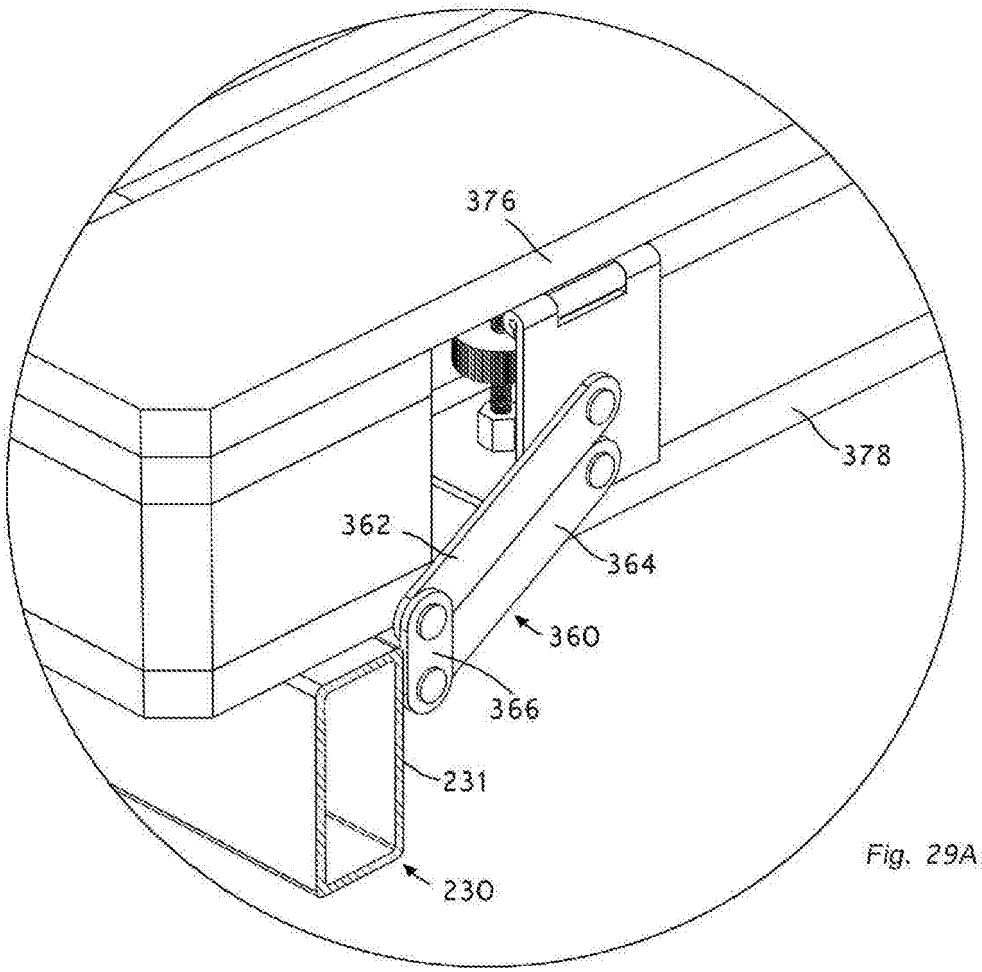

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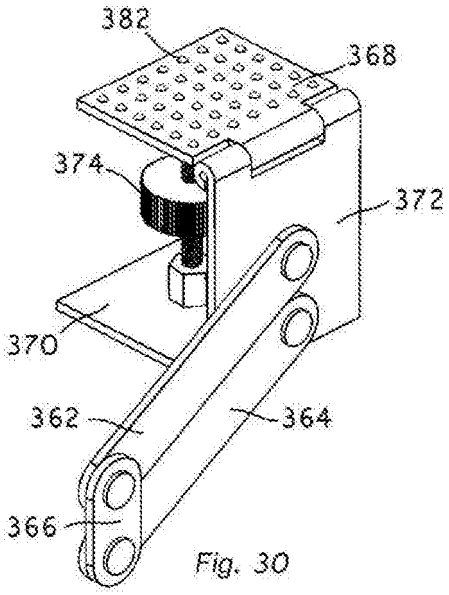

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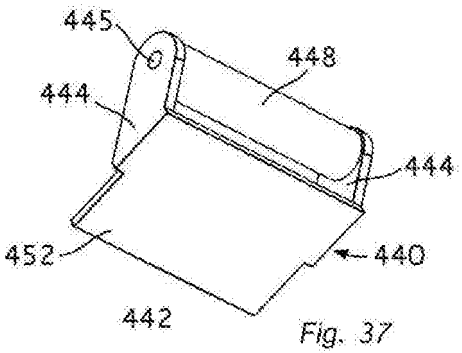

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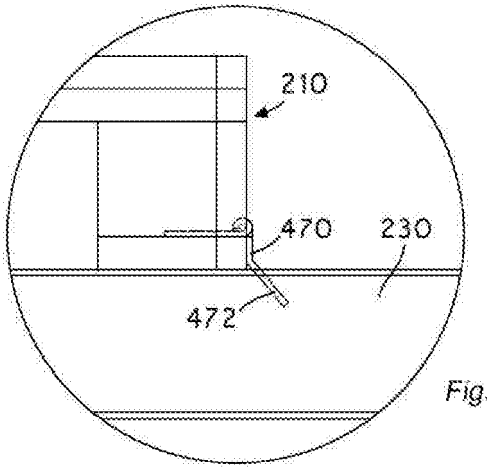

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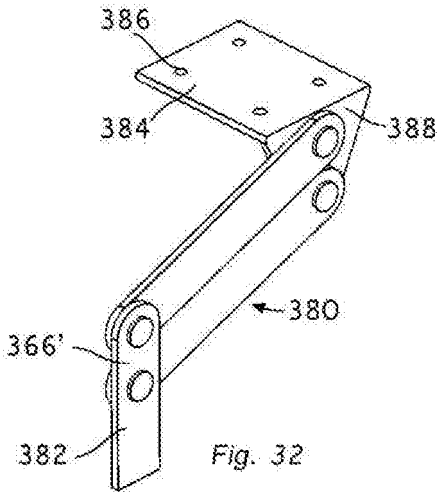

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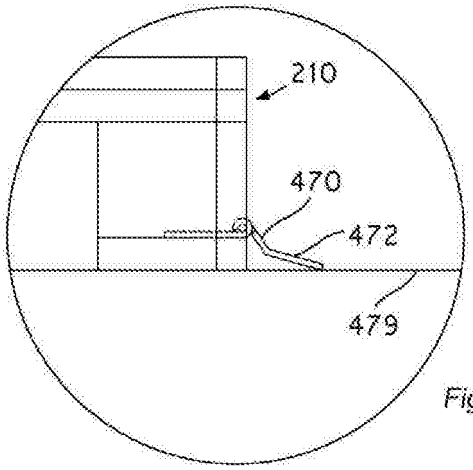

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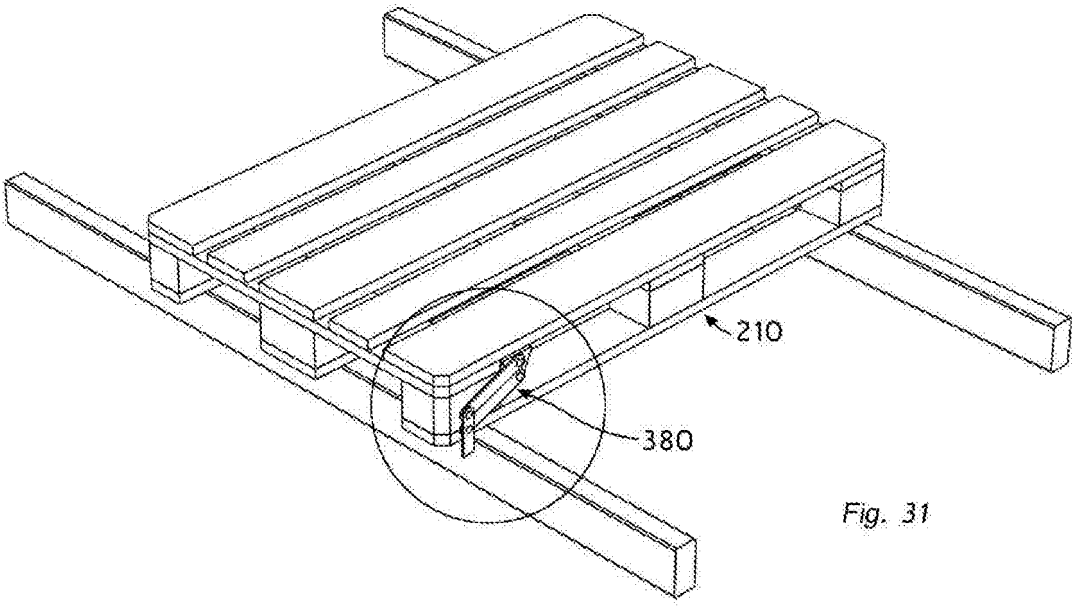

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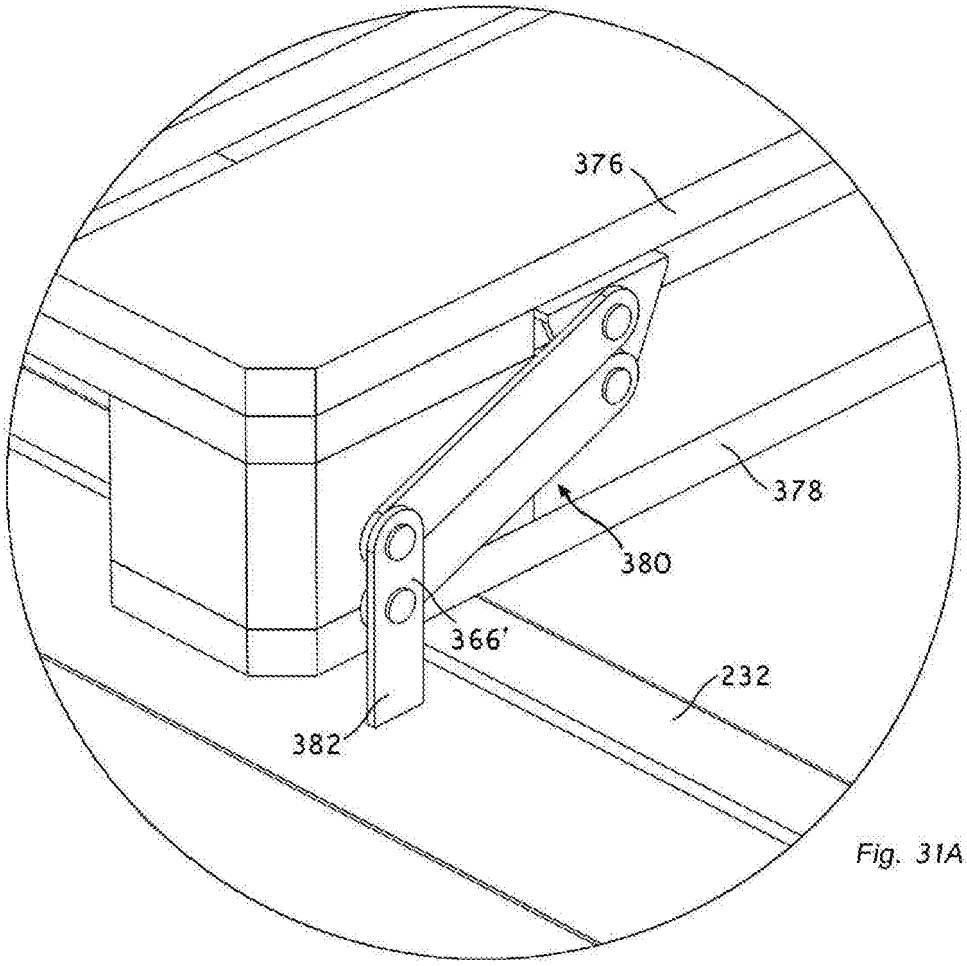
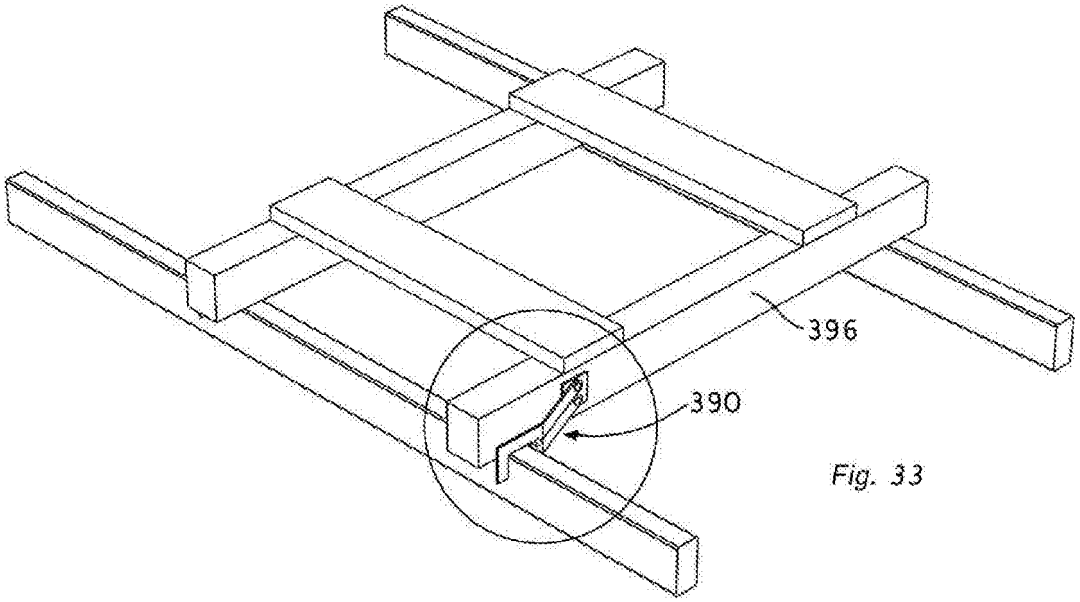


Fig. 31A



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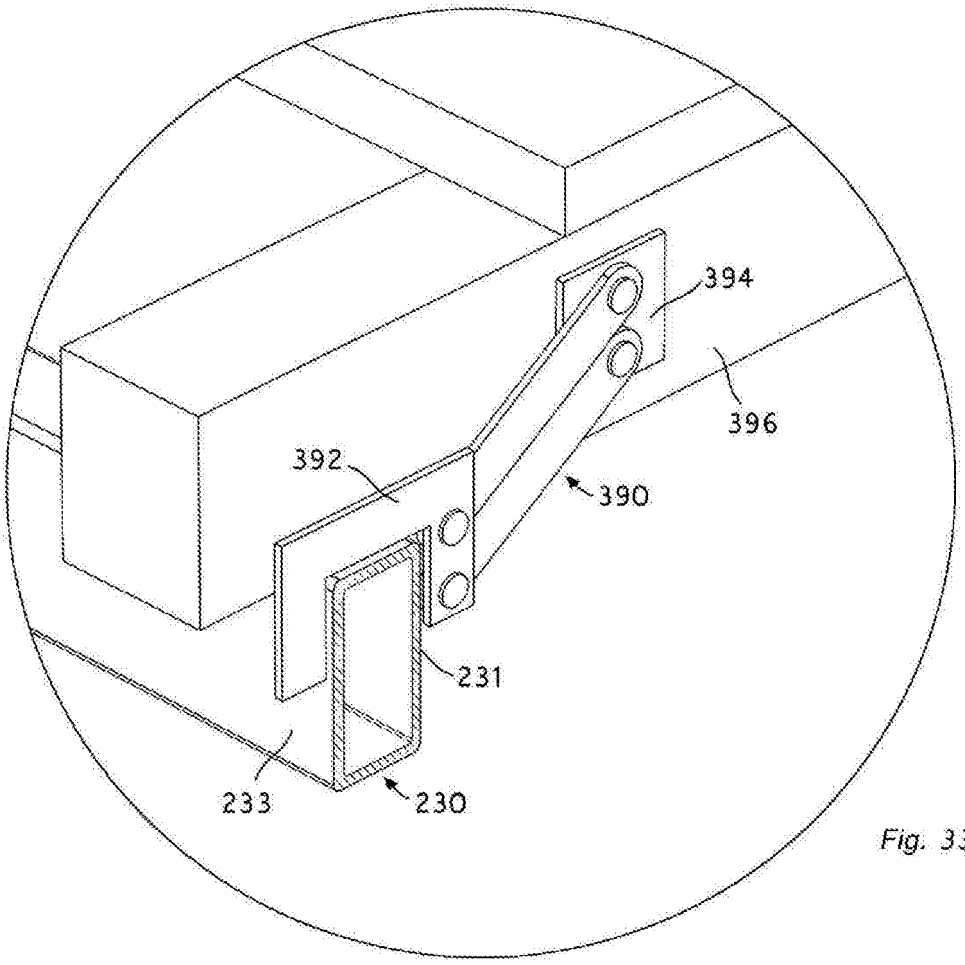

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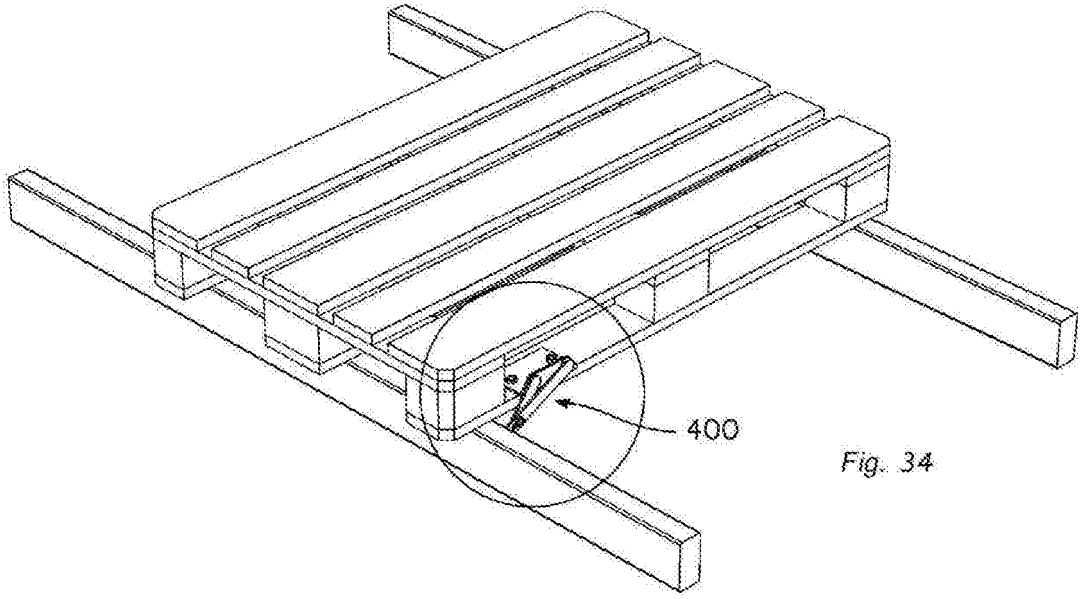

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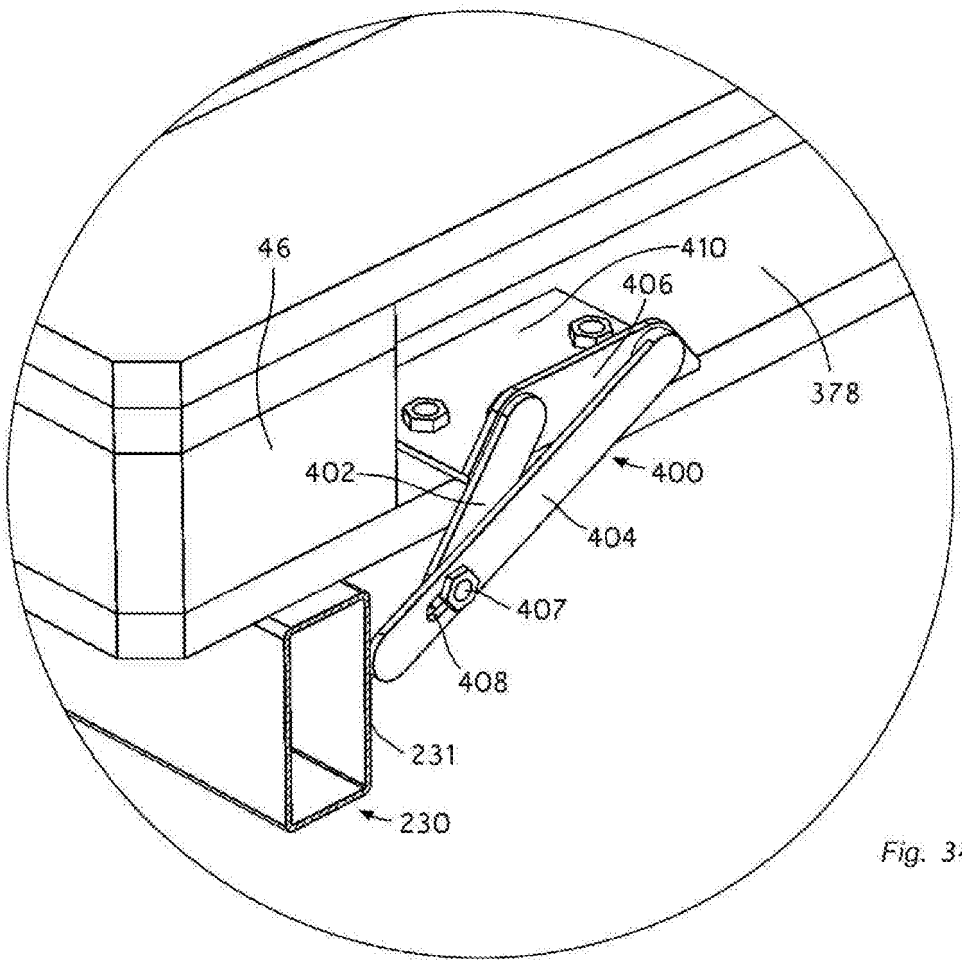
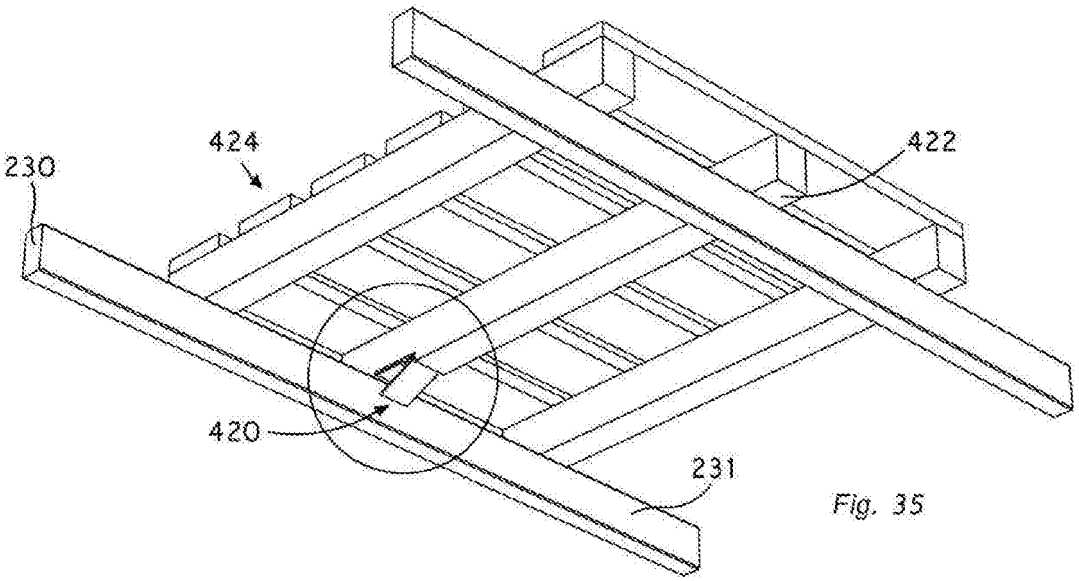


Fig. 34A



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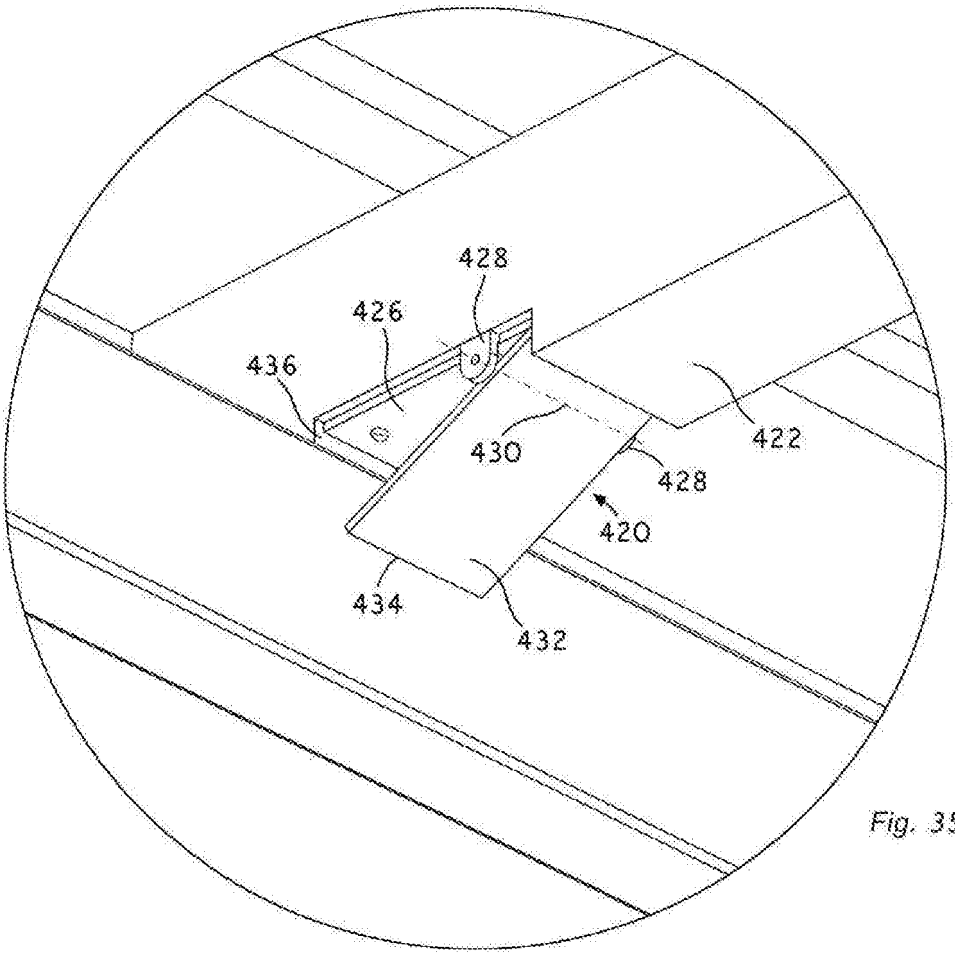
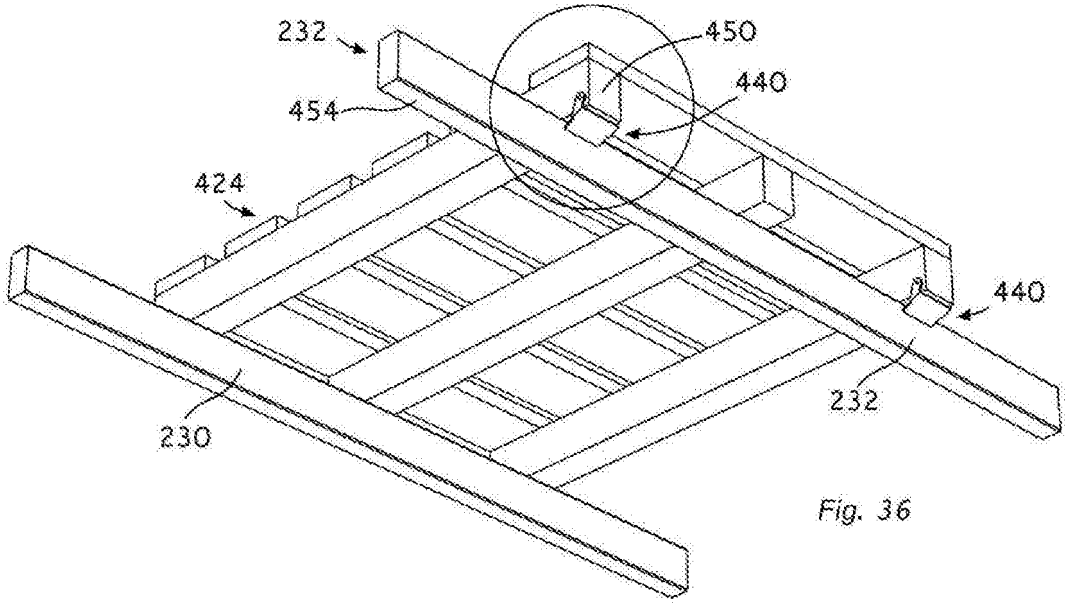


Fig. 35A



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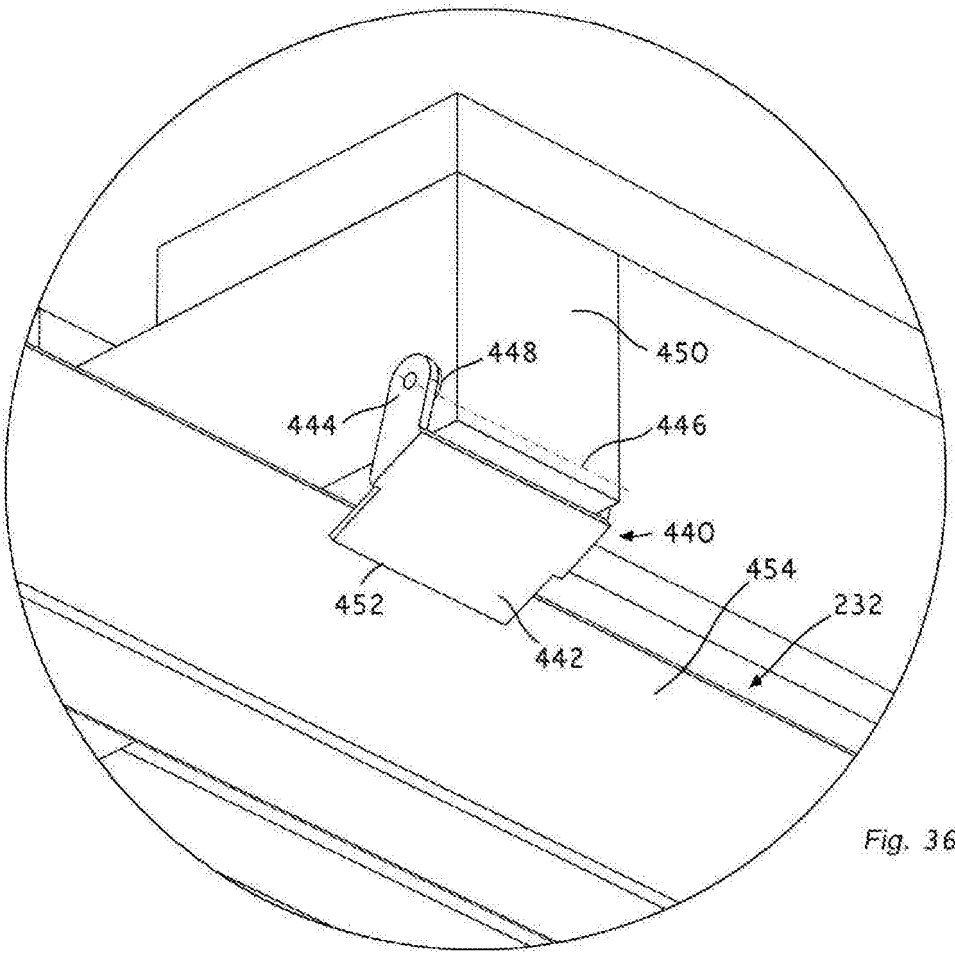
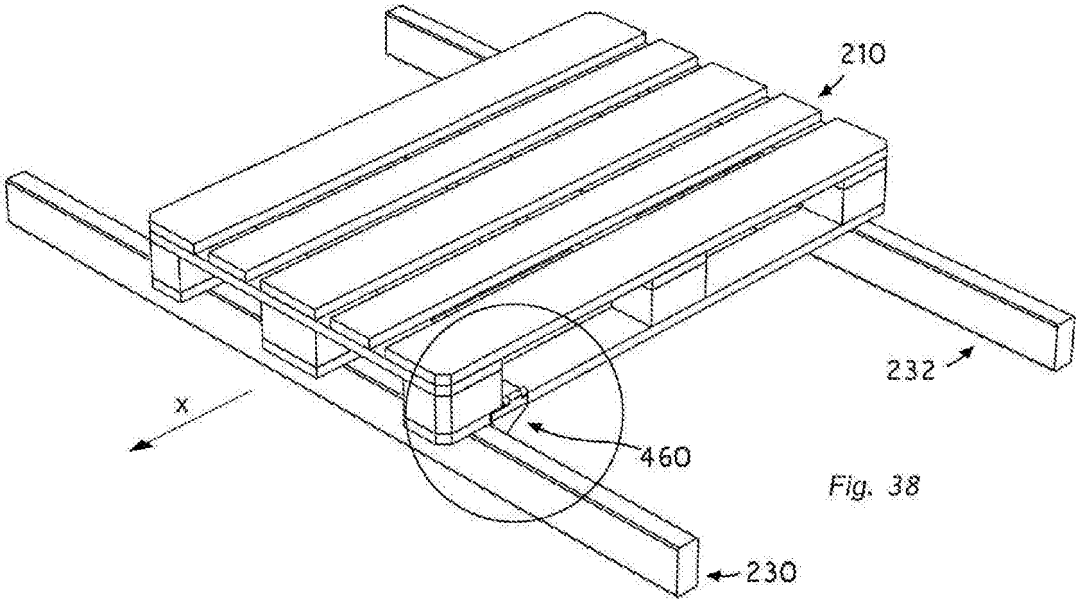


Fig. 36A



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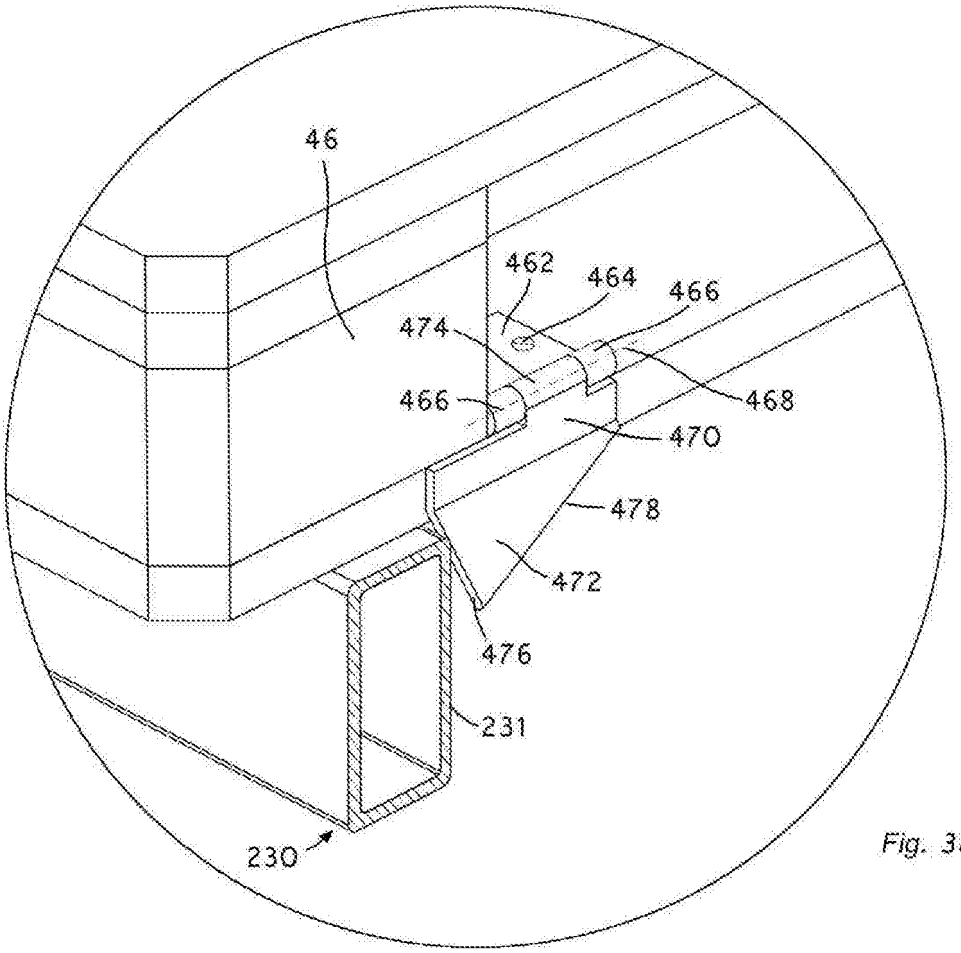
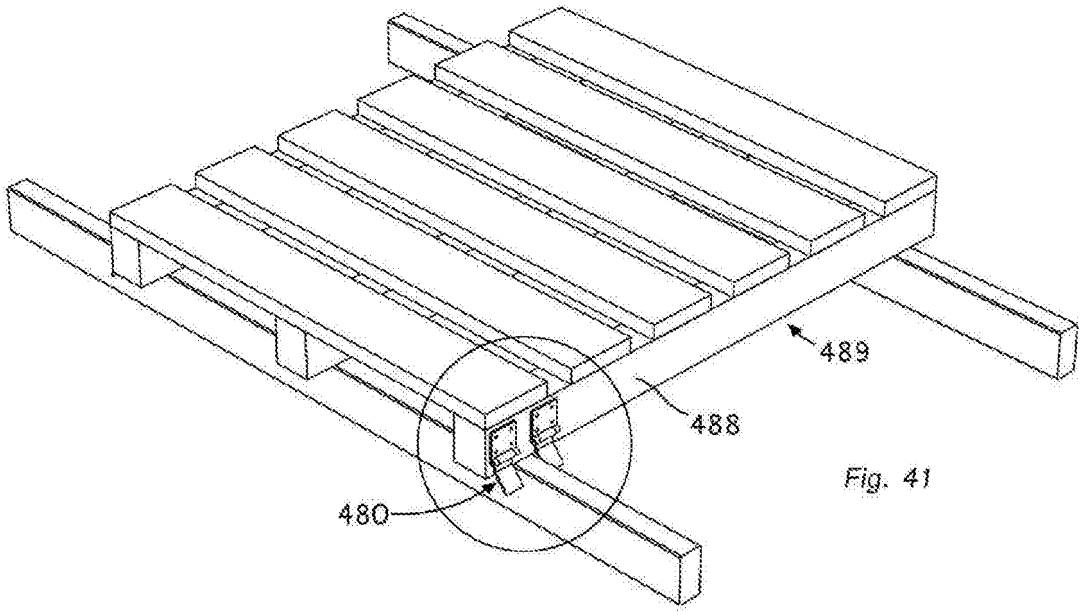


Fig. 38A



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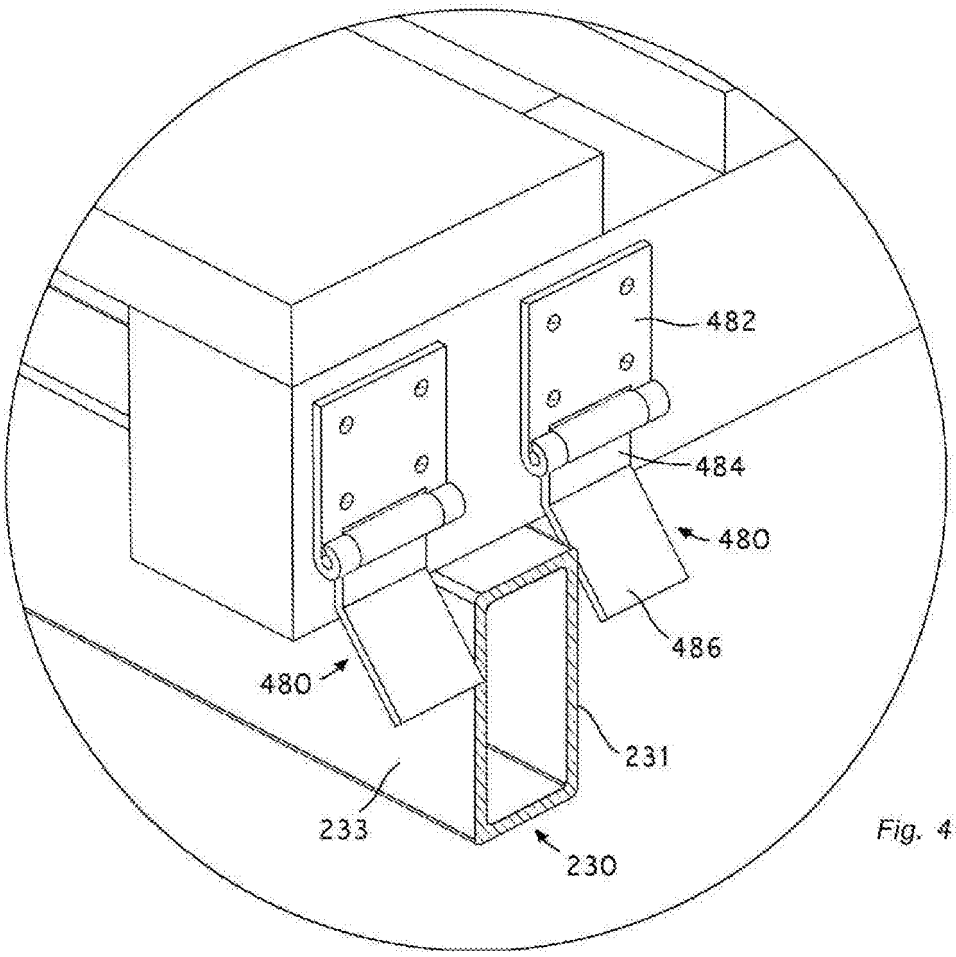

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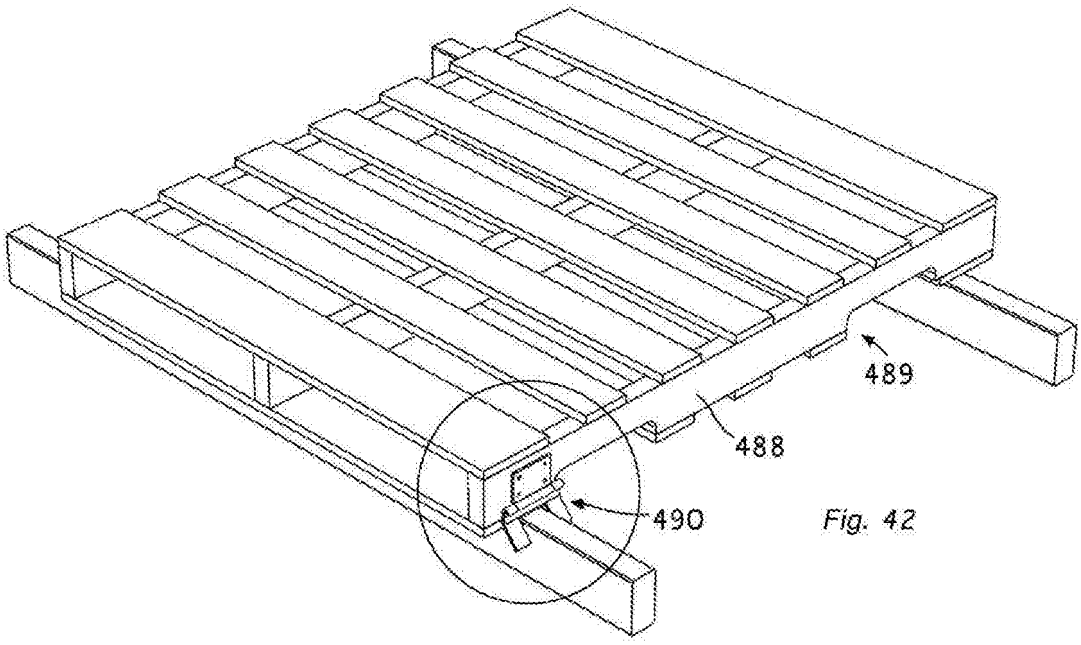

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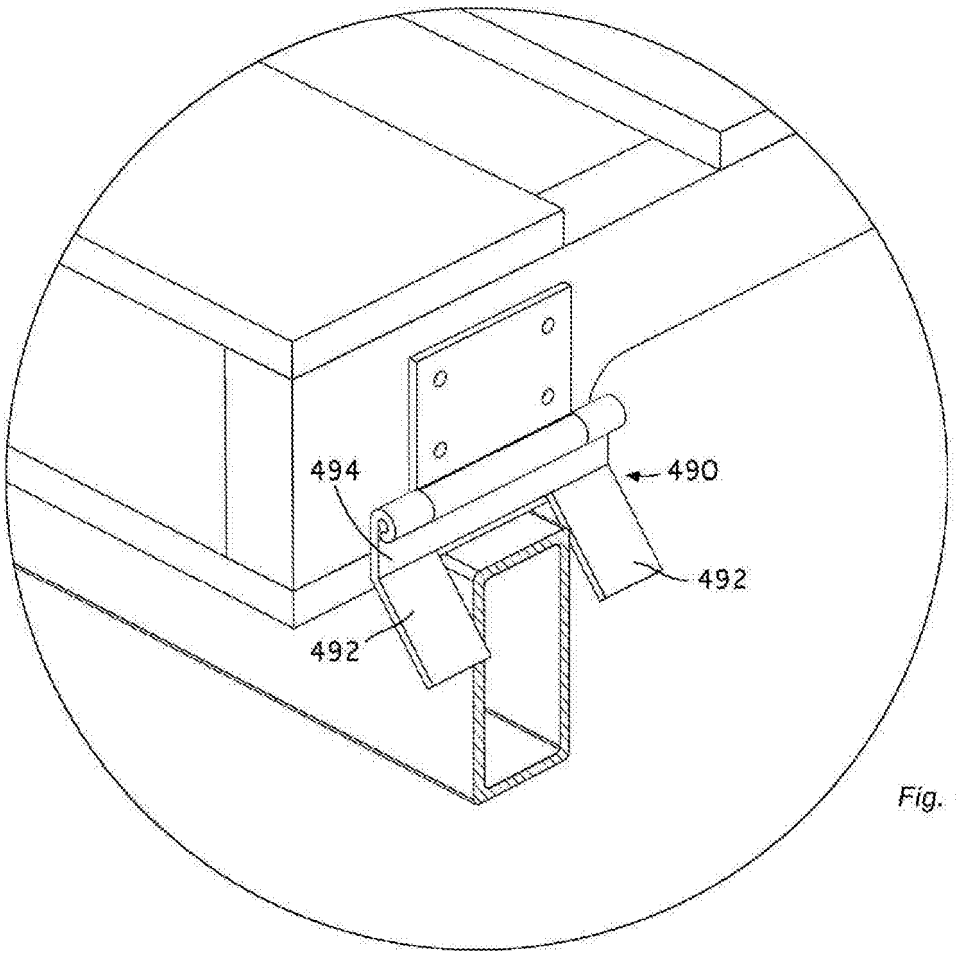
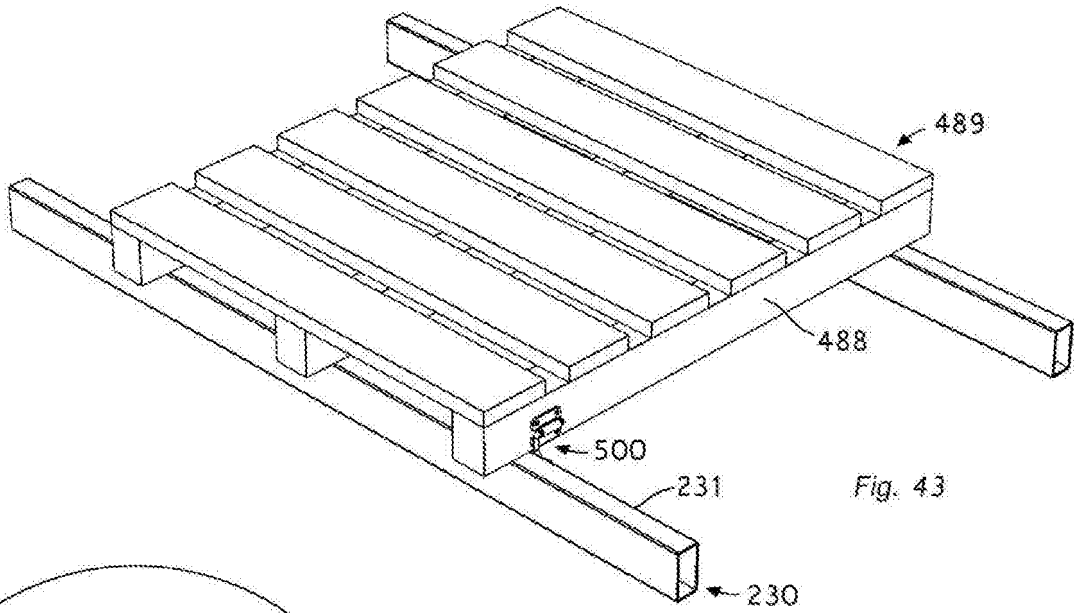


Fig. 42A



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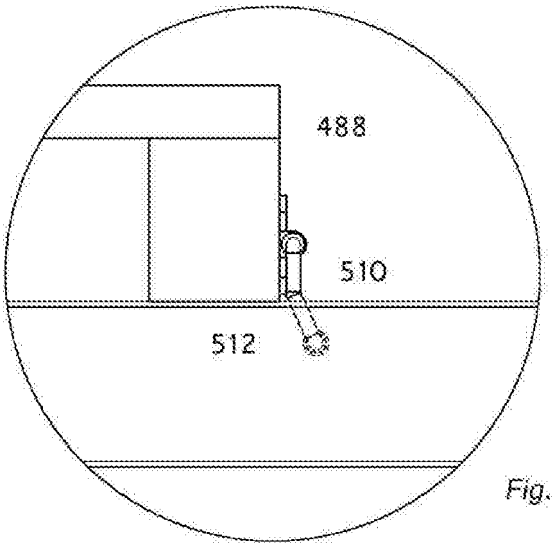

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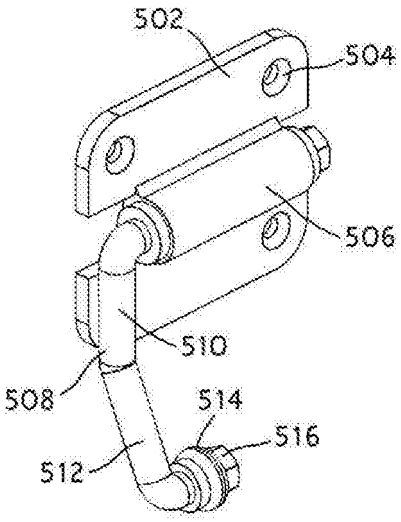

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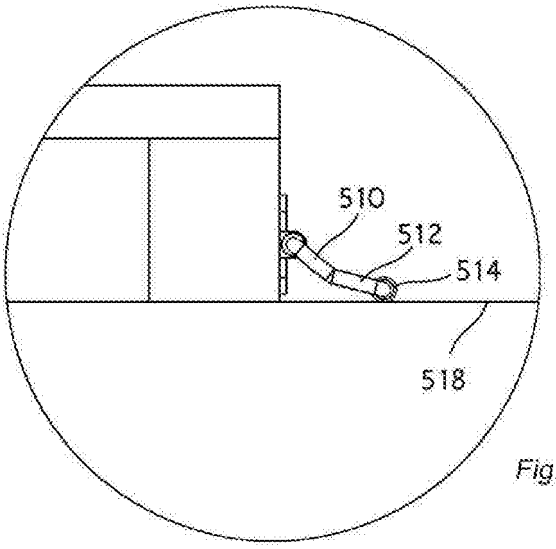

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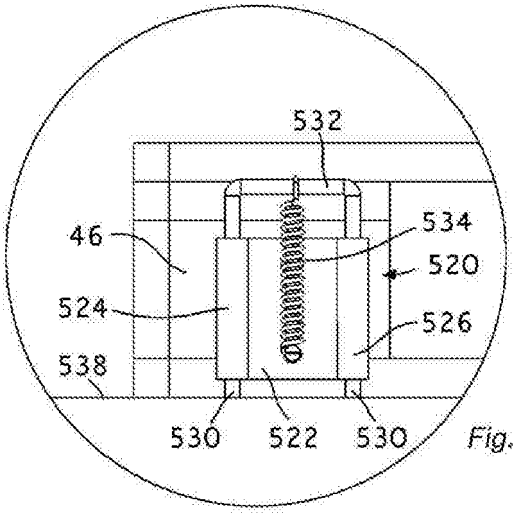

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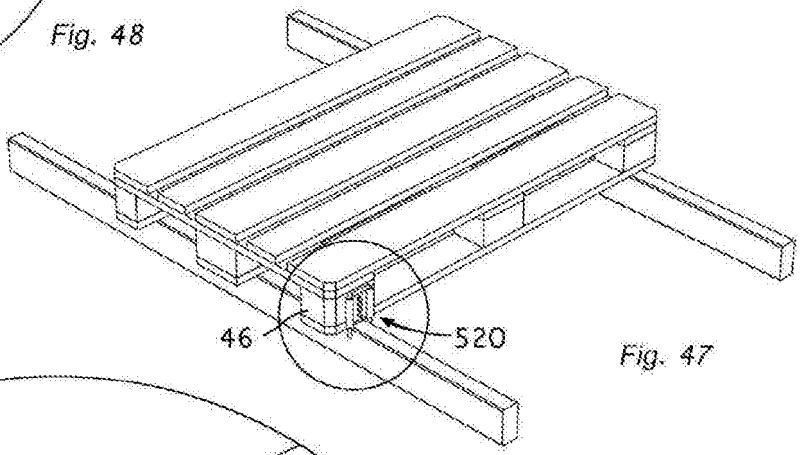

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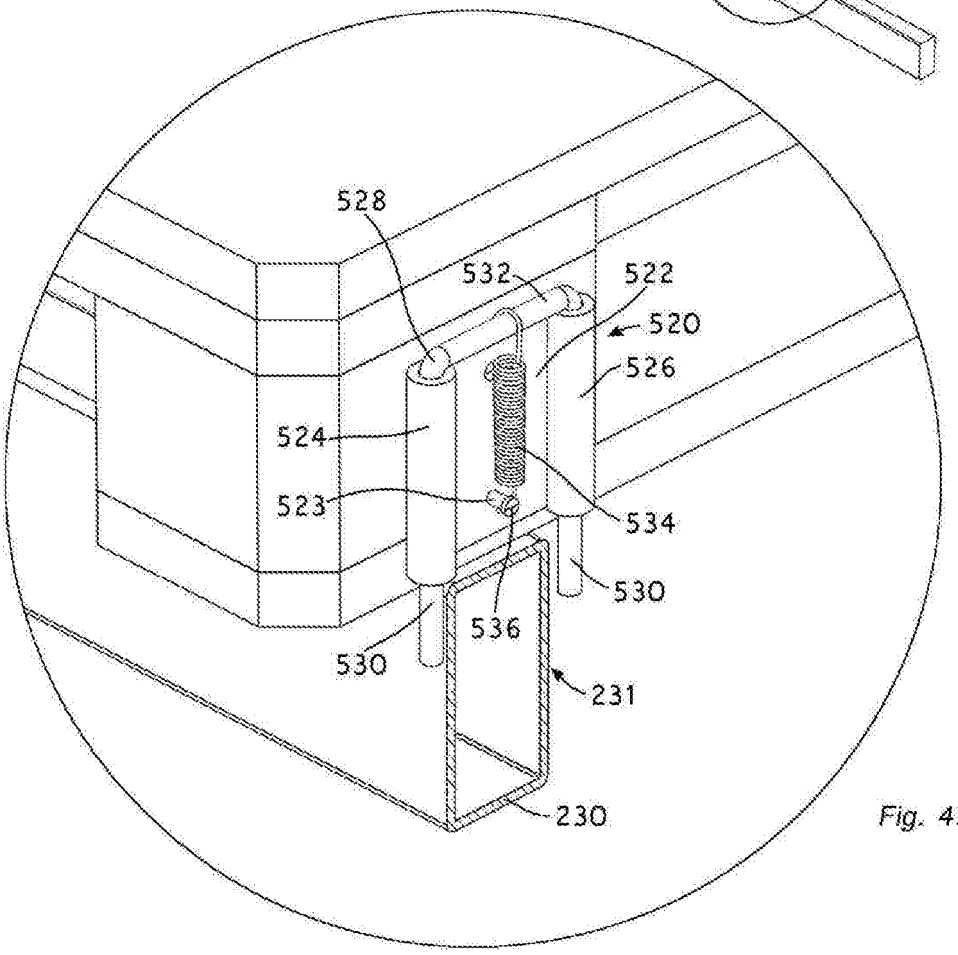

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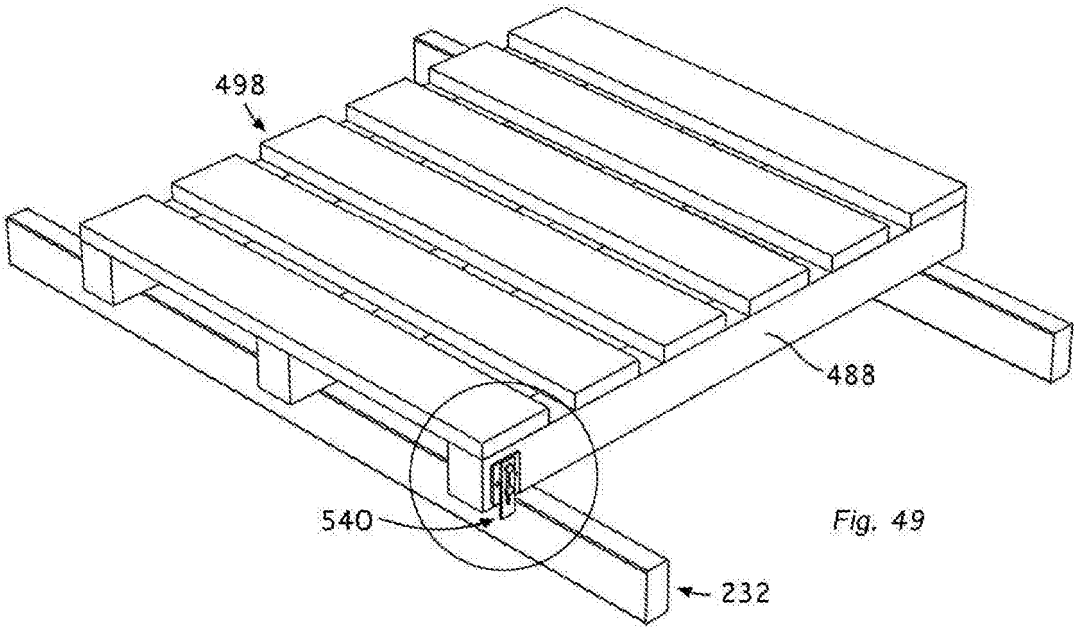

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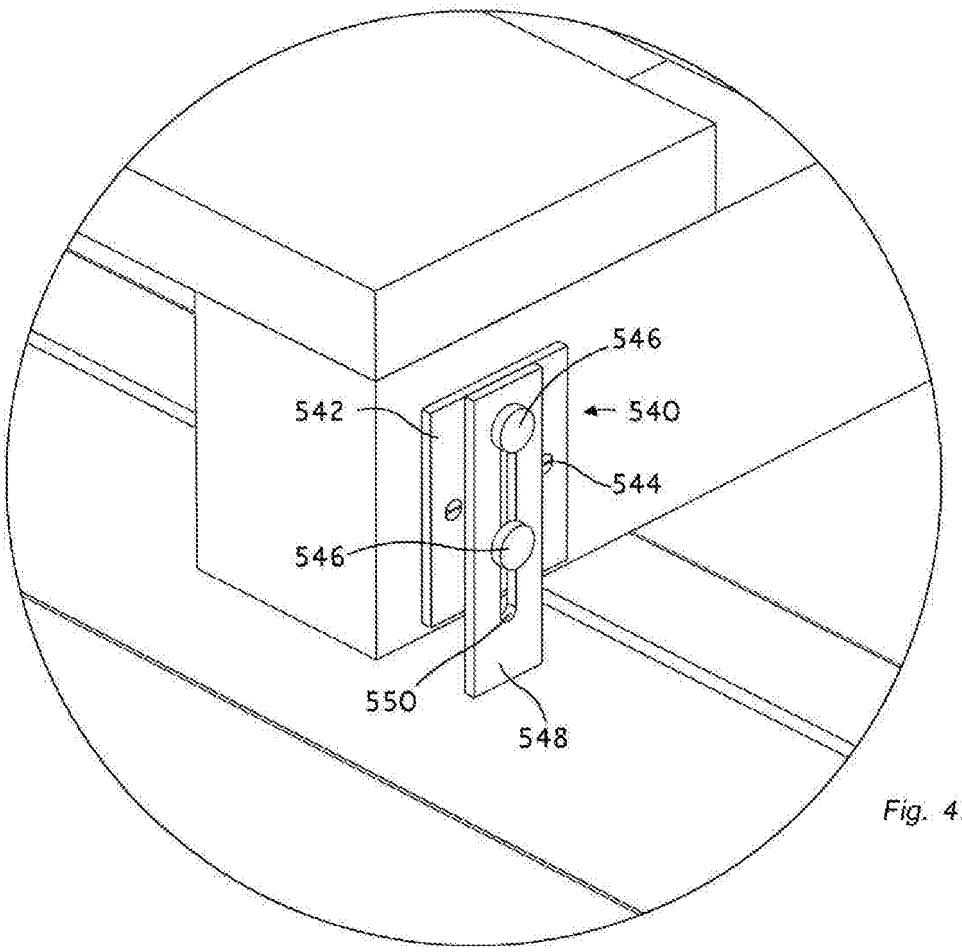

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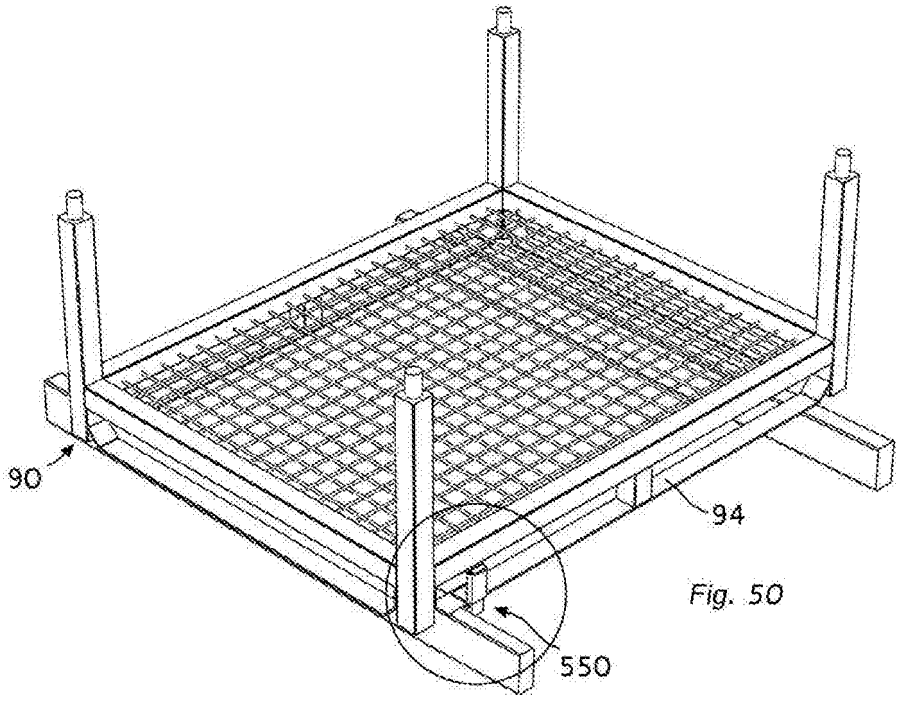

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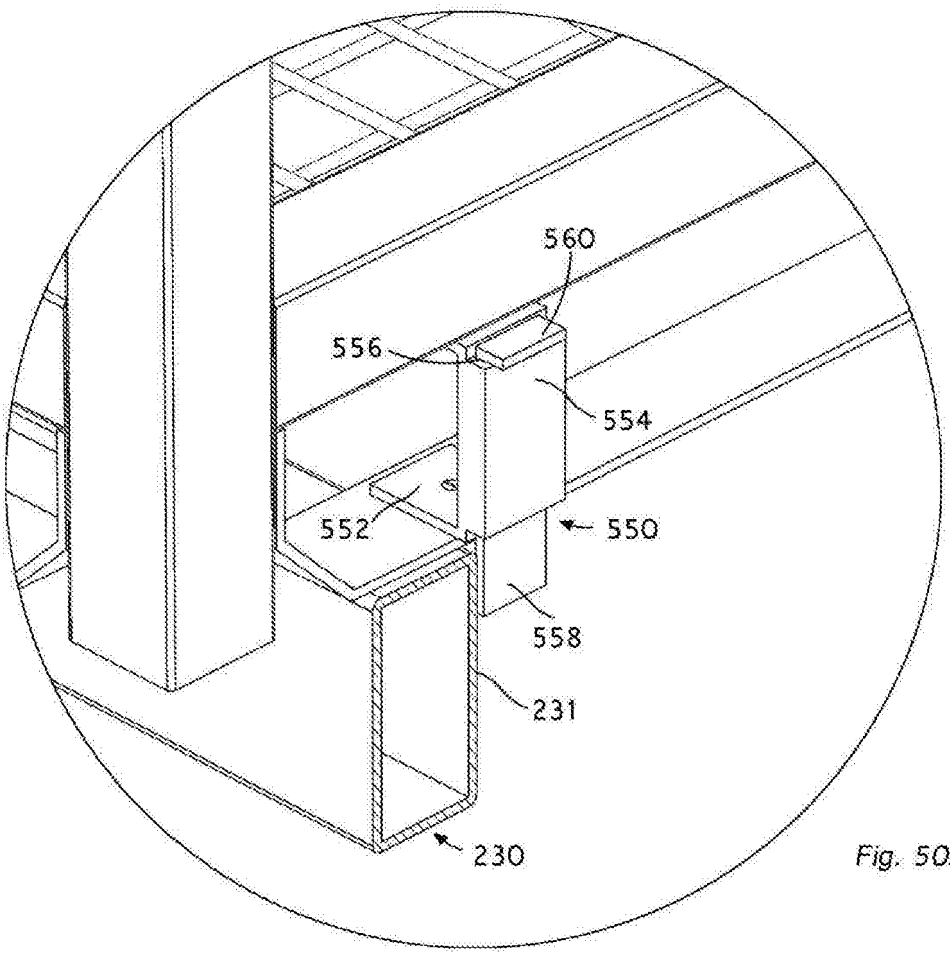

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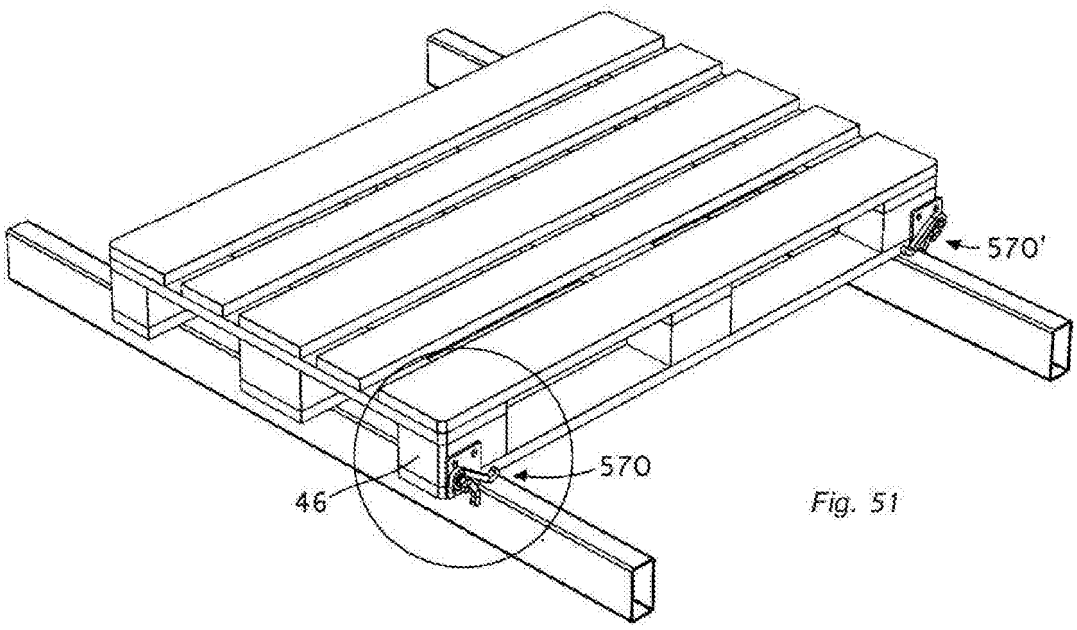

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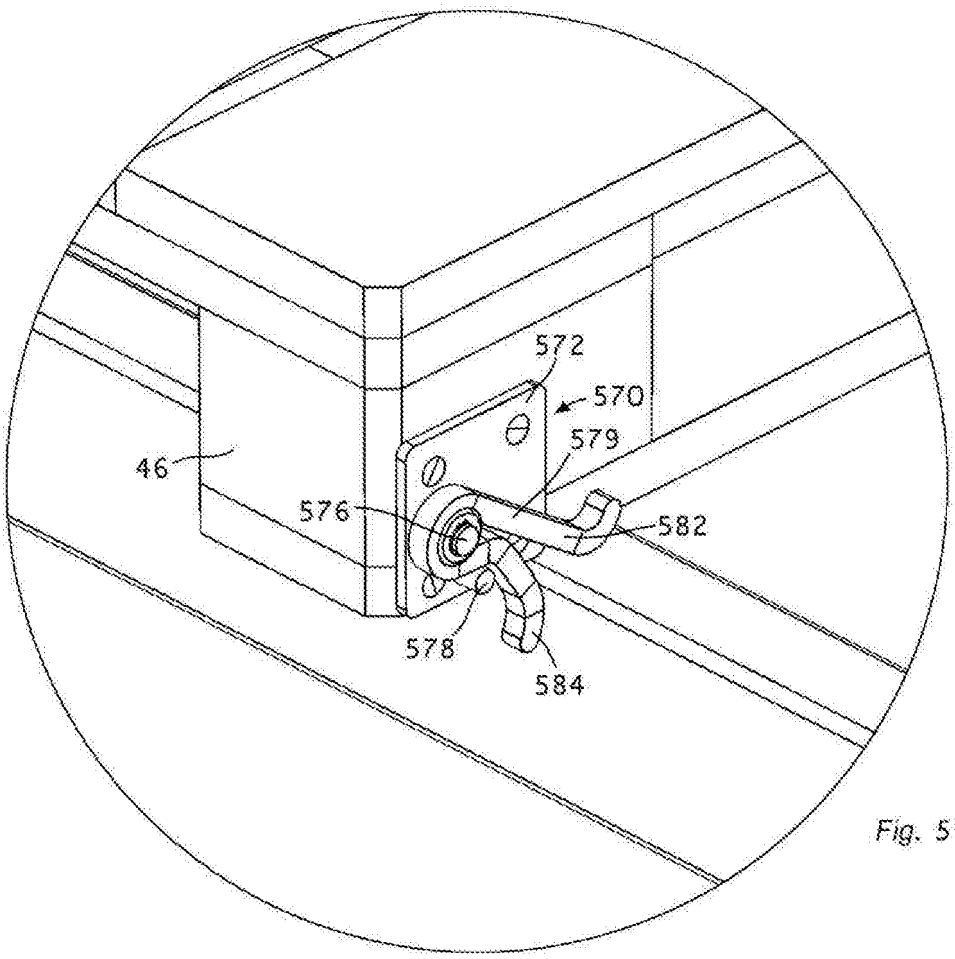

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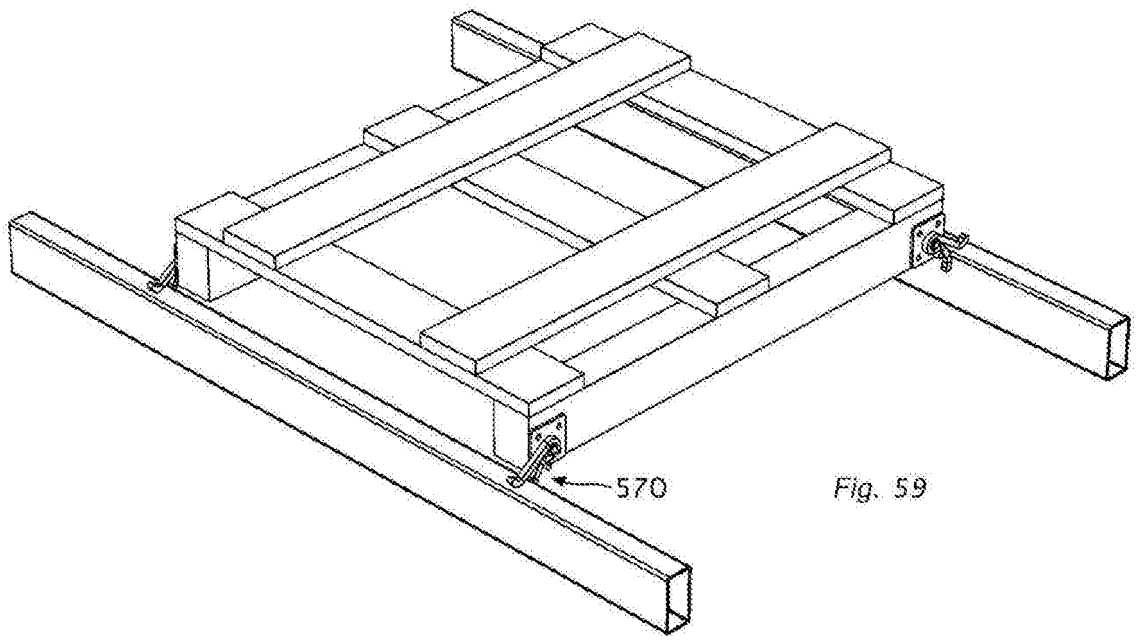

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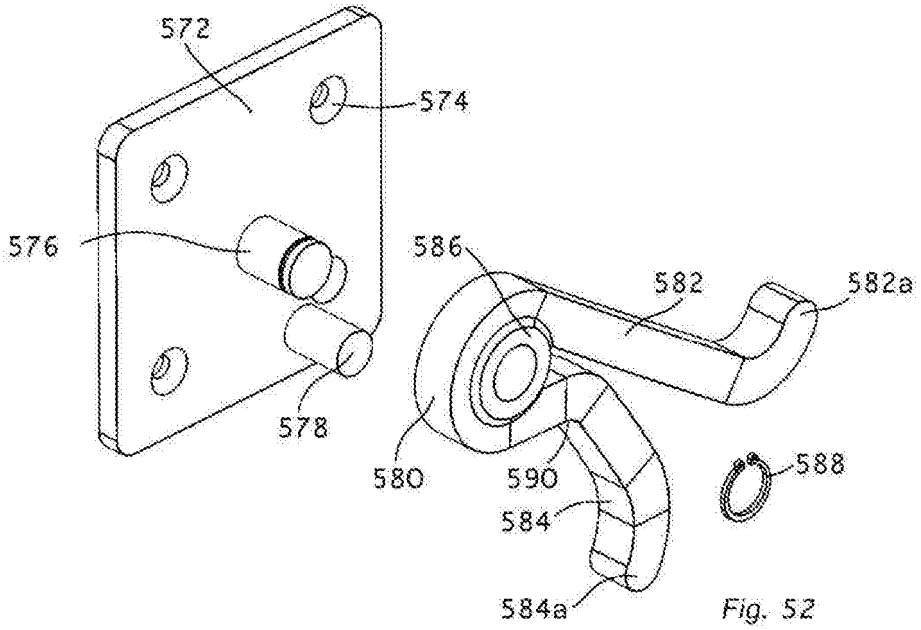

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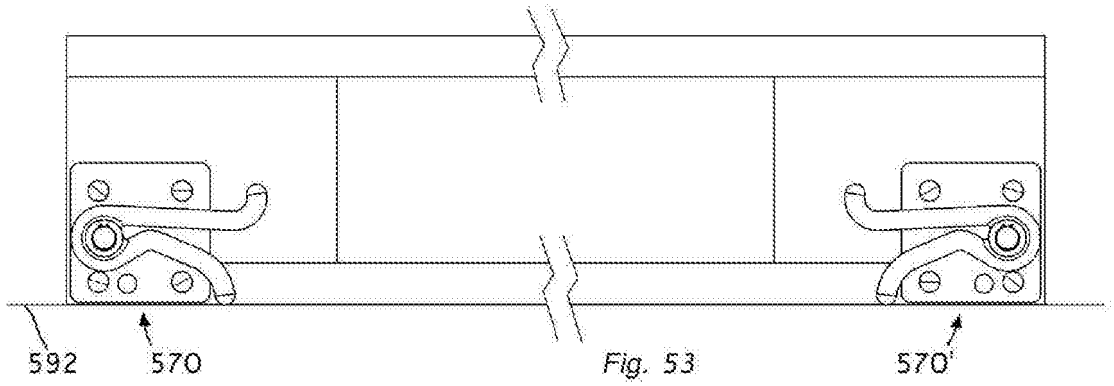

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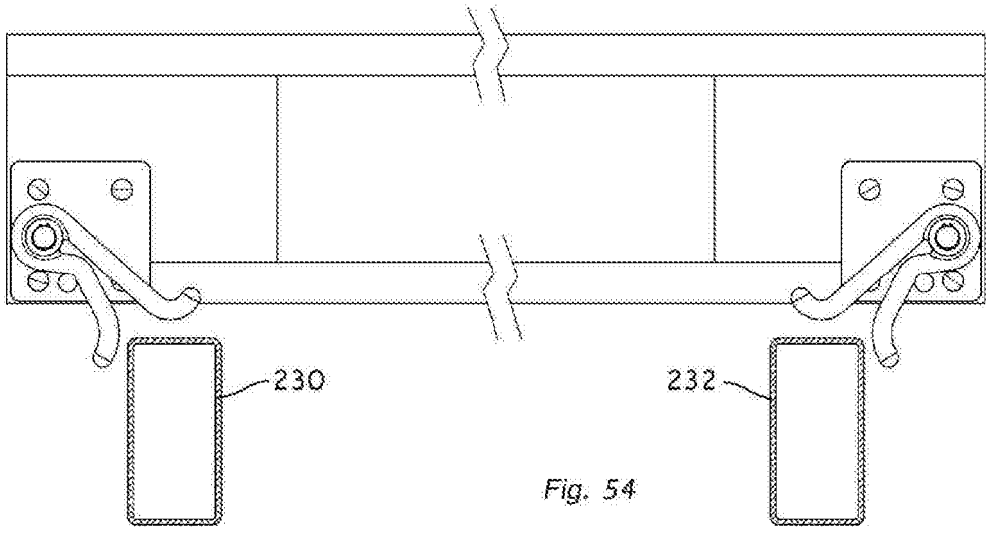

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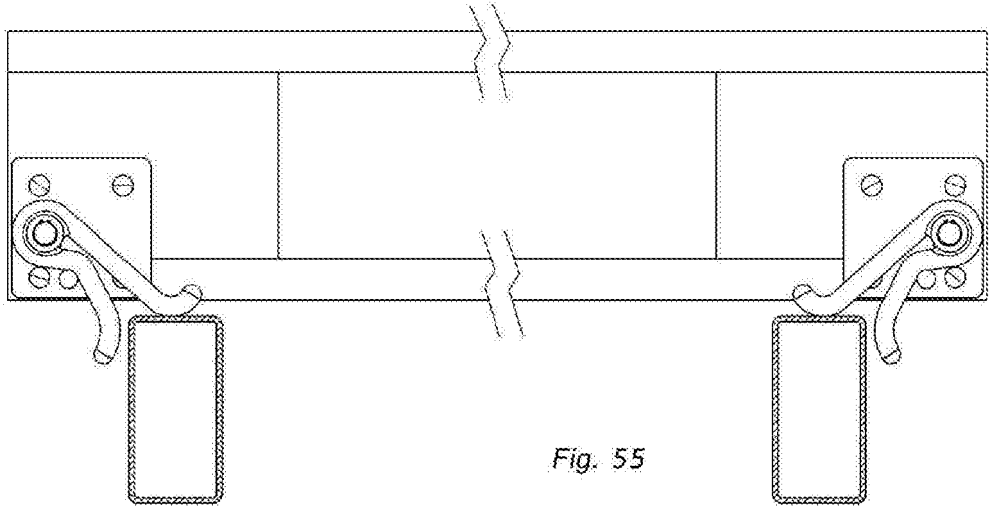
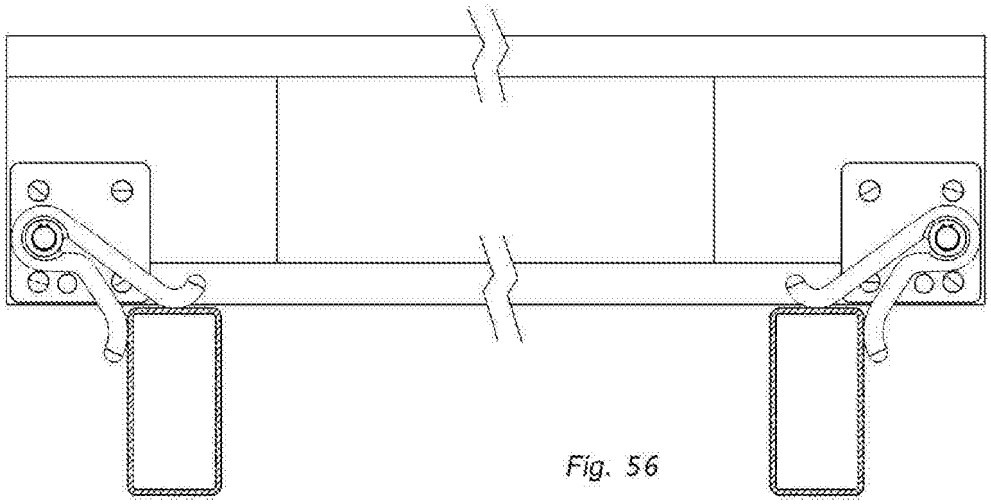


Fig. 55



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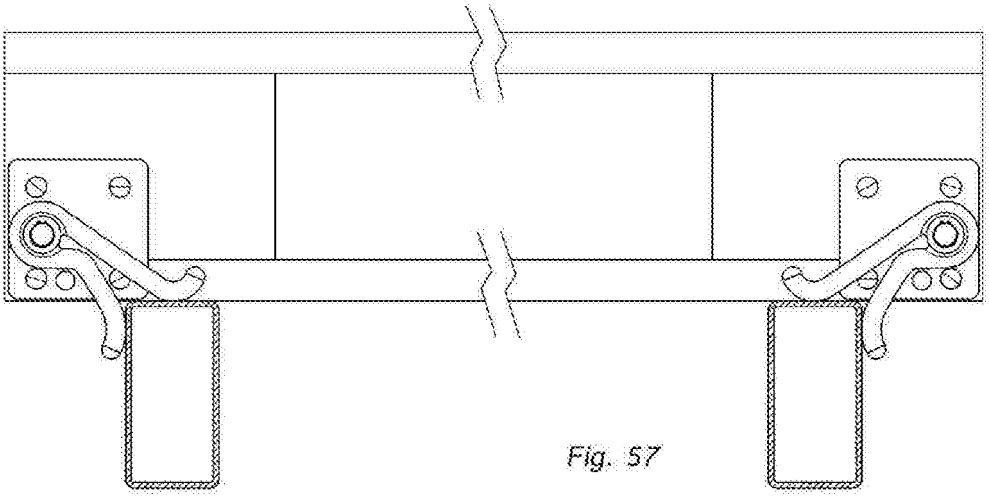

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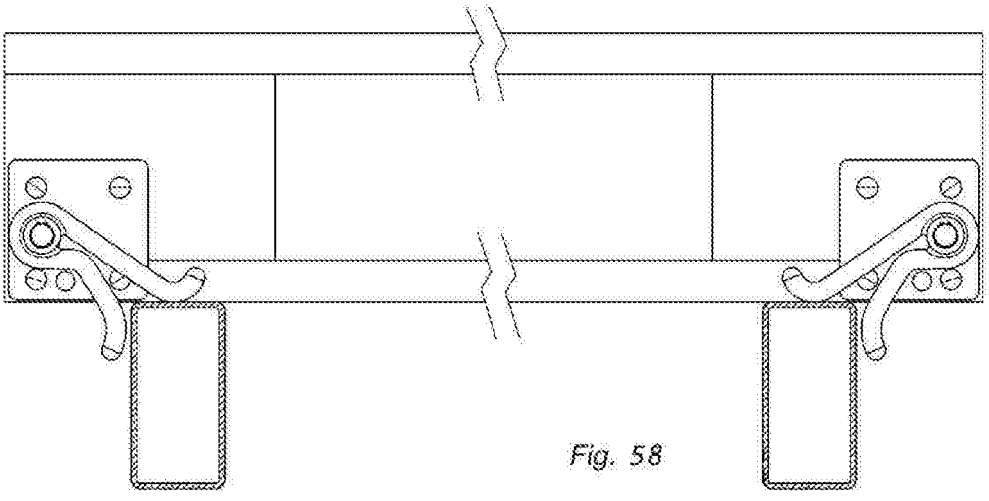

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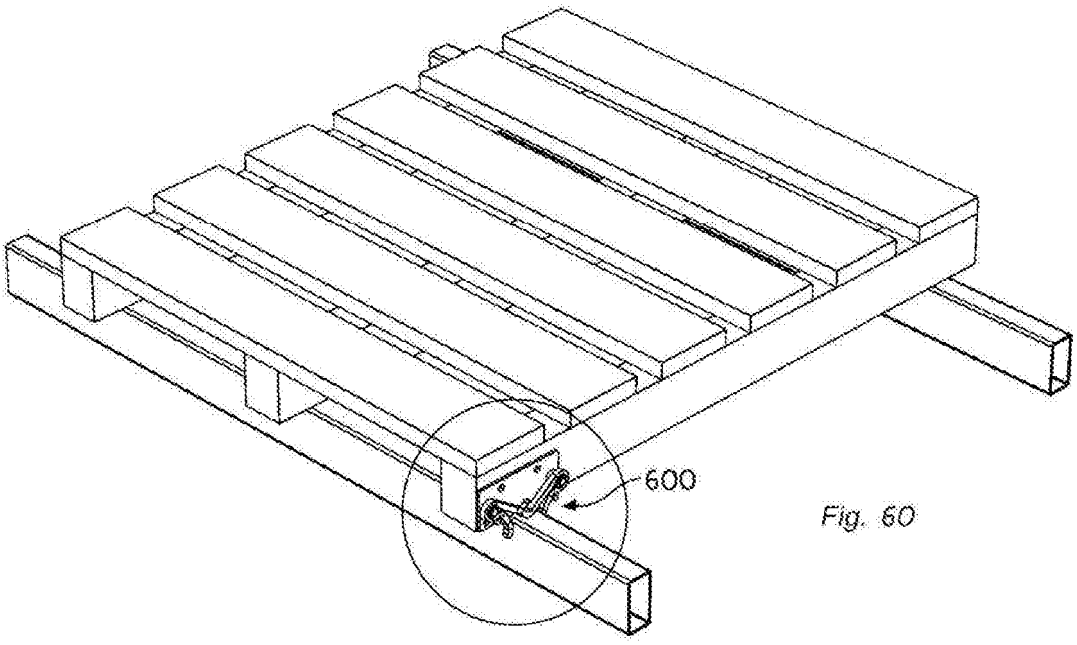

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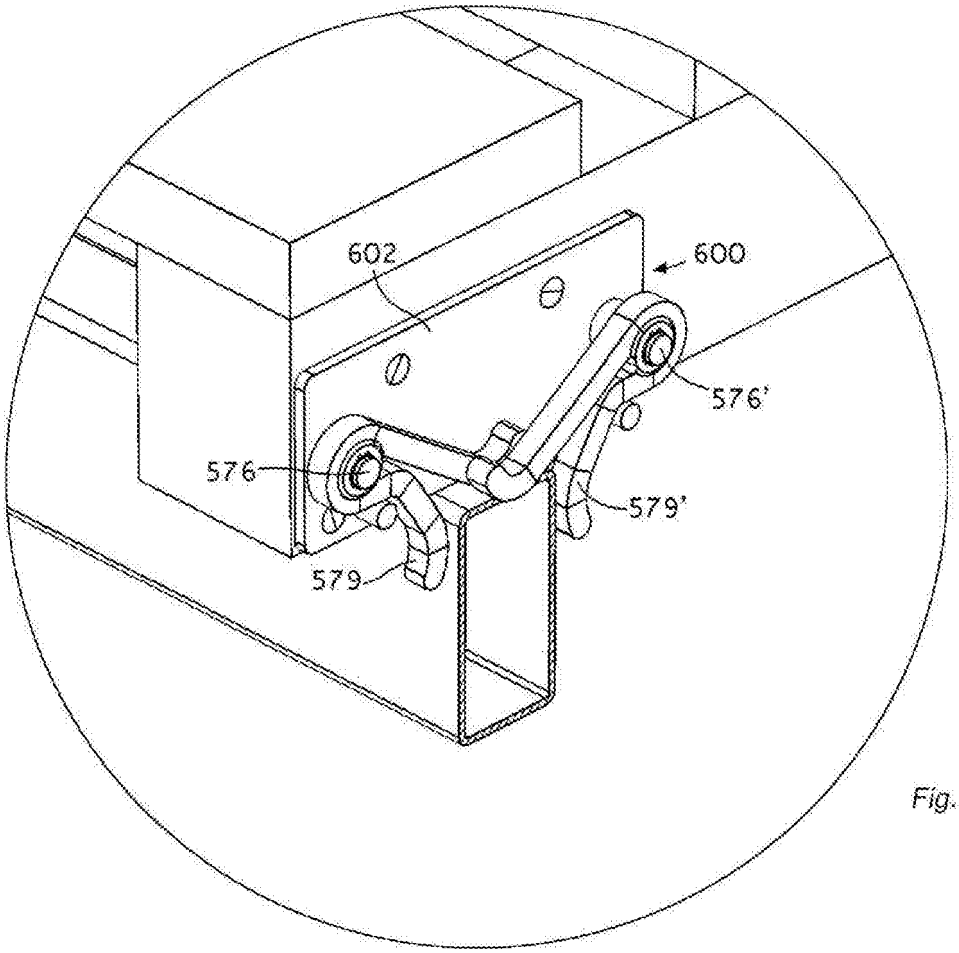
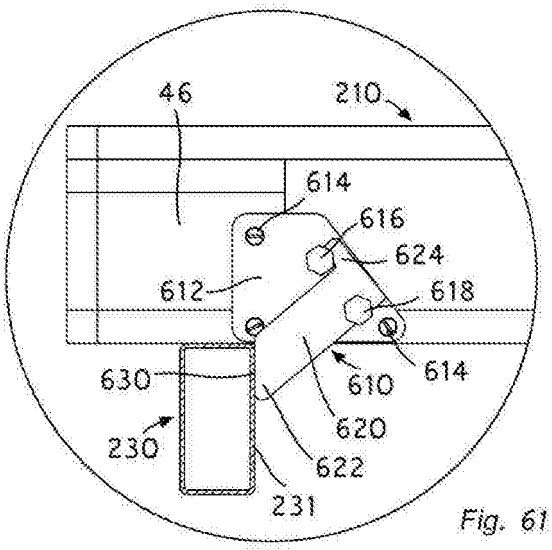


Fig. 60A



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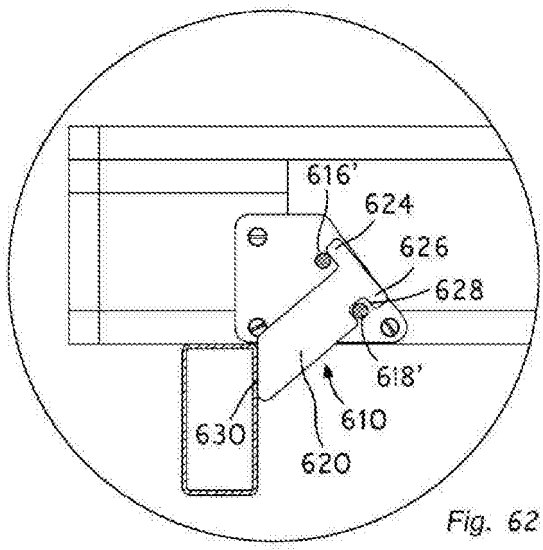

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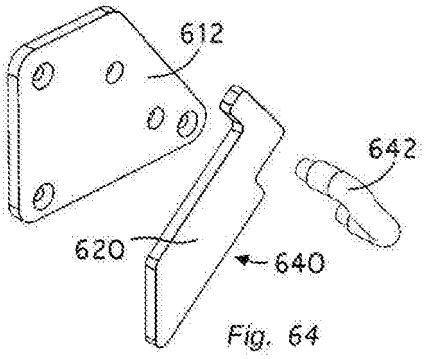

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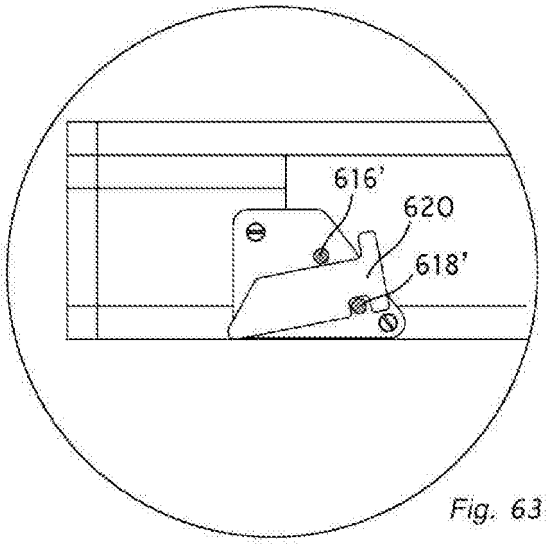

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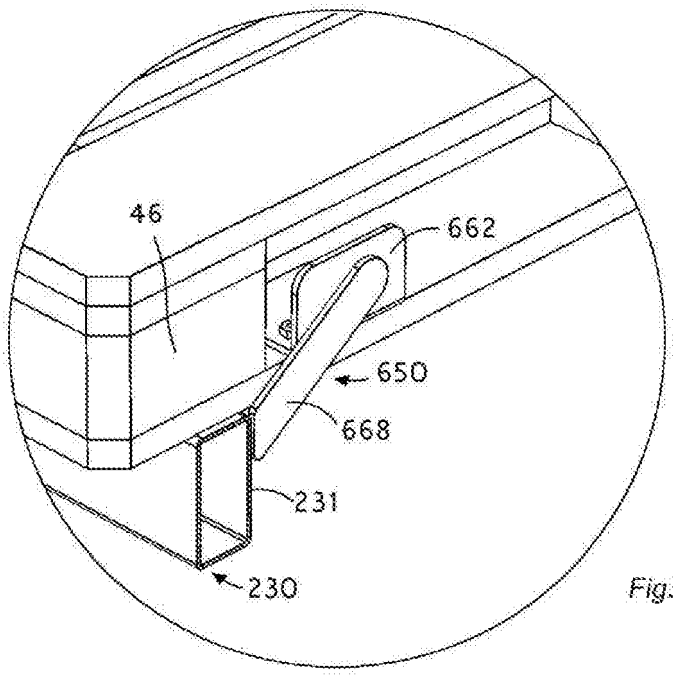


Fig. 65

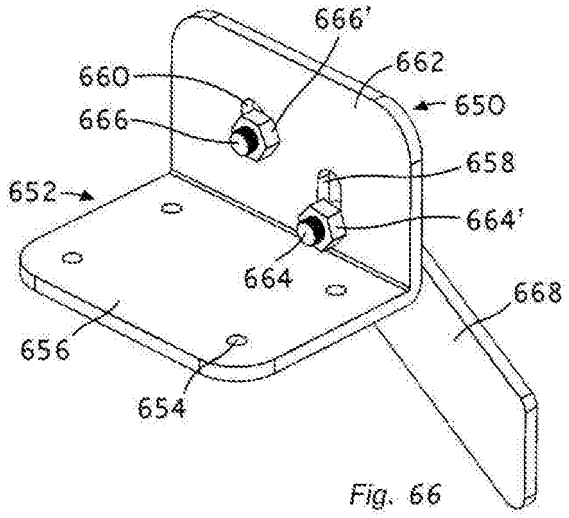


Fig. 66

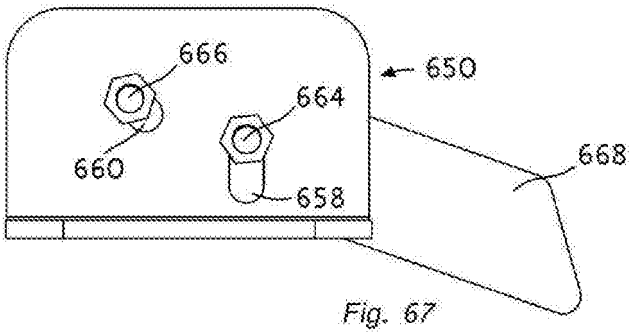


Fig. 67

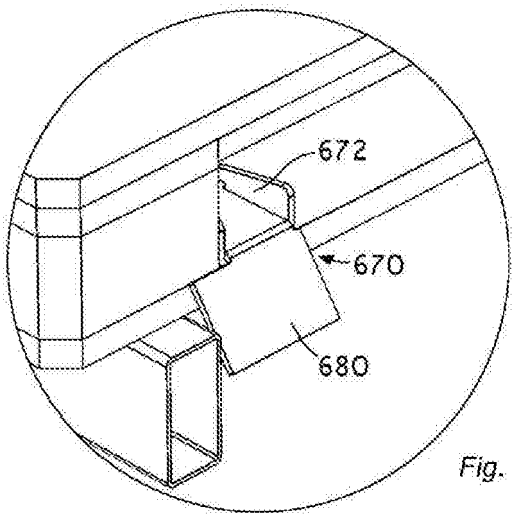
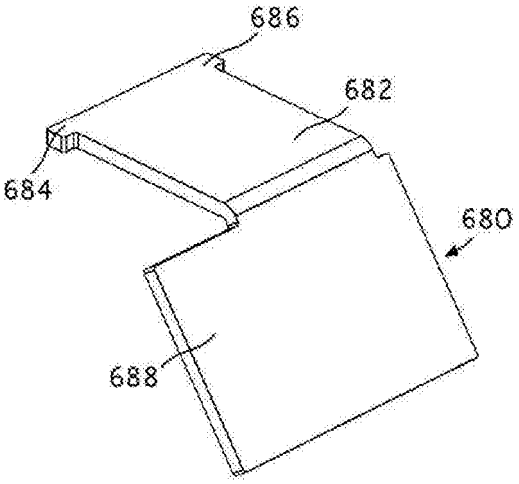
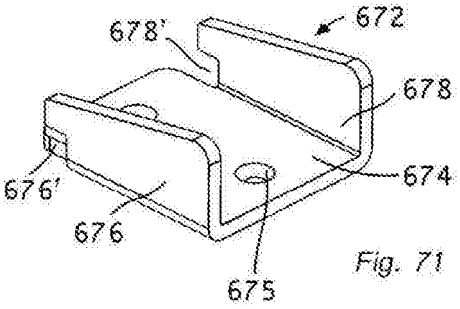


Fig. 68





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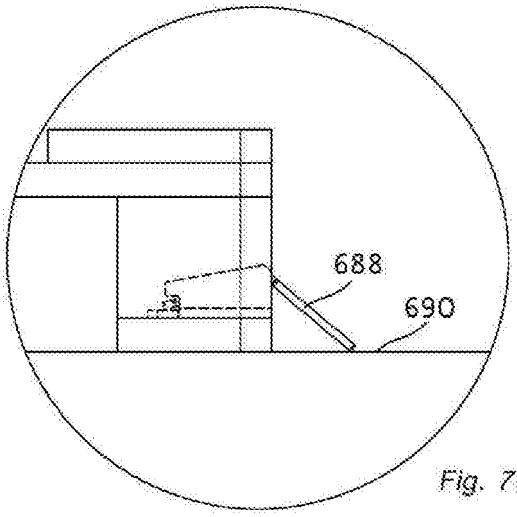

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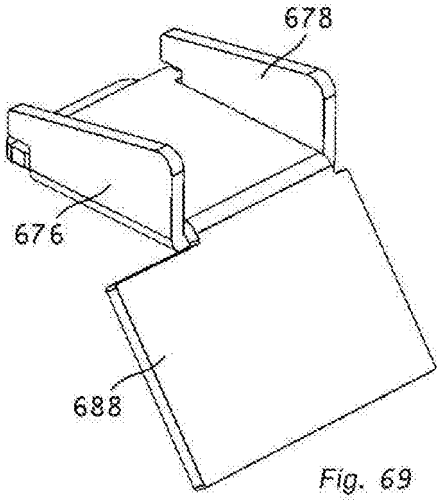


Fig. 69

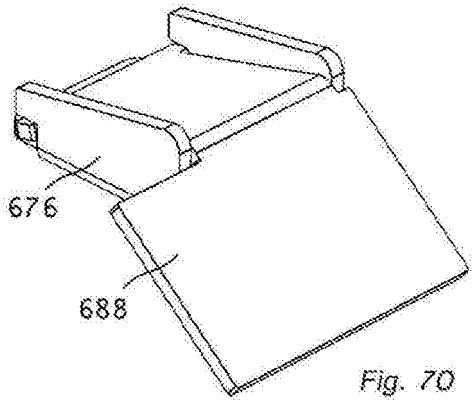
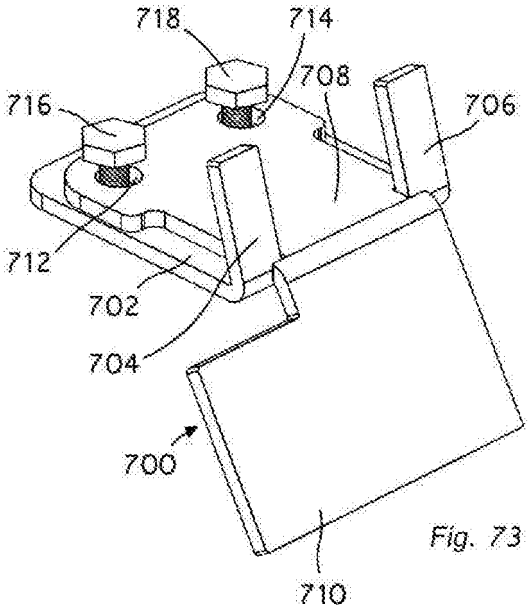


Fig. 70



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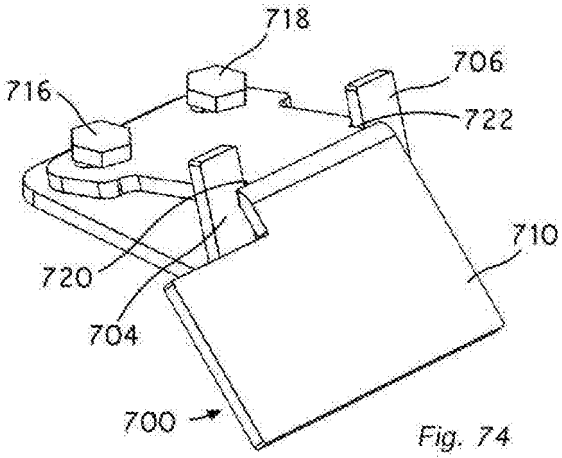

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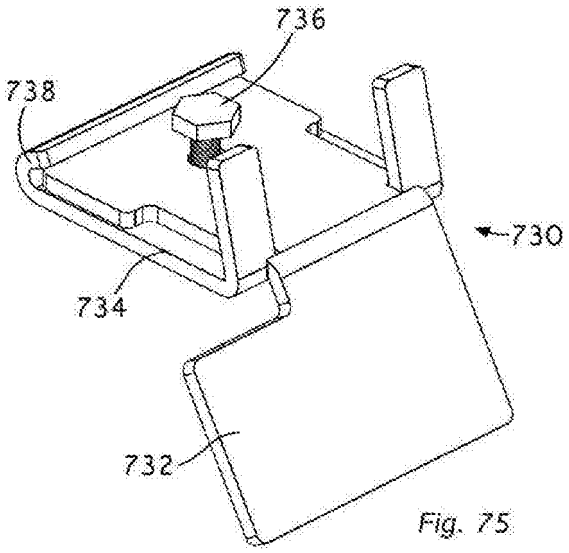
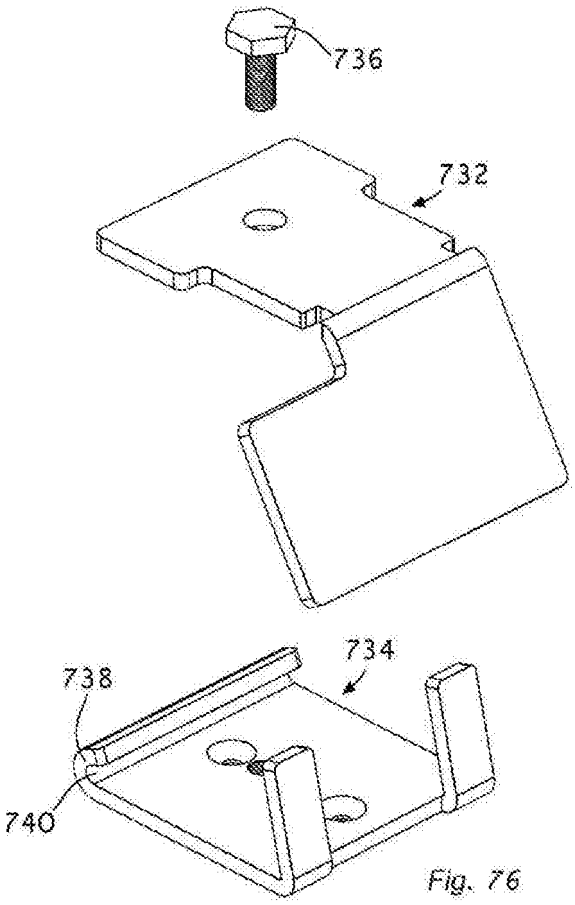


Fig. 75



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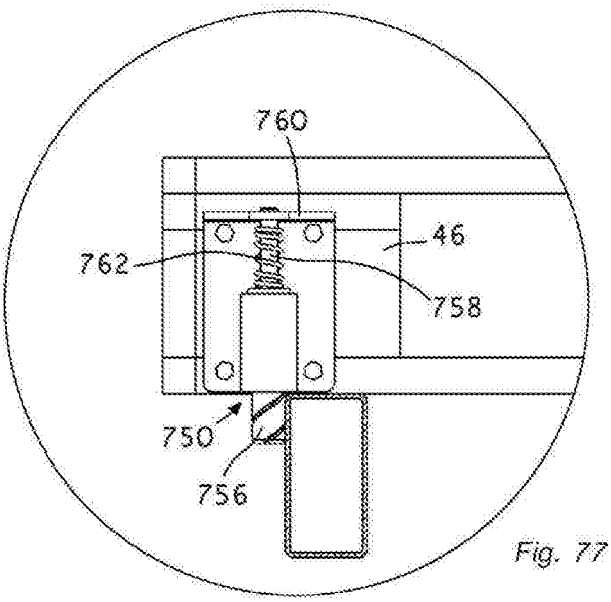


Fig. 77

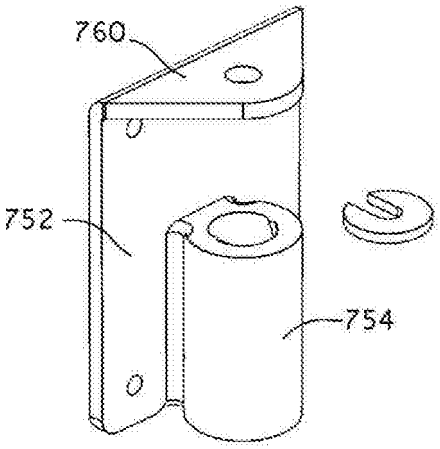
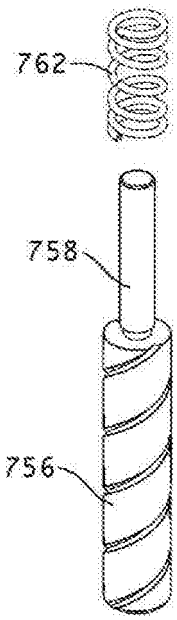


Fig. 78



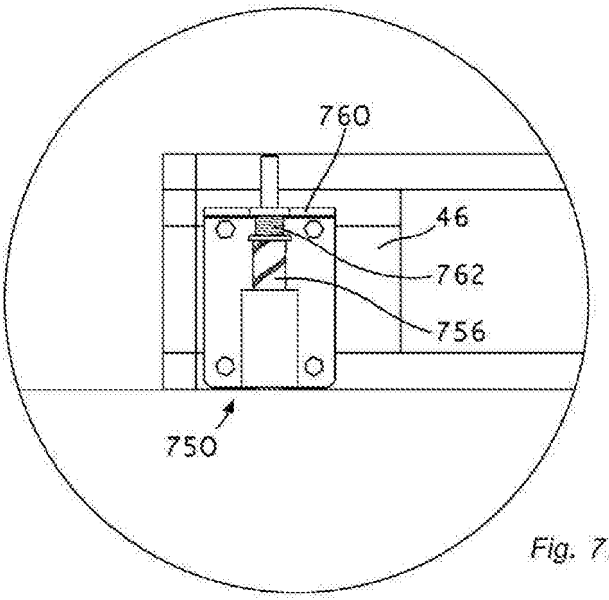
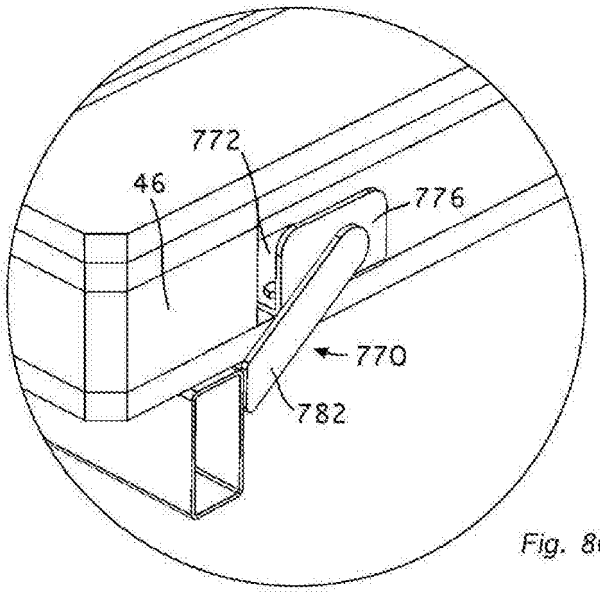


Fig. 79



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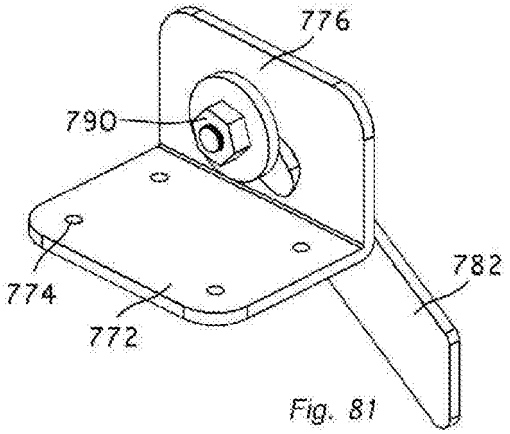


Fig. 81

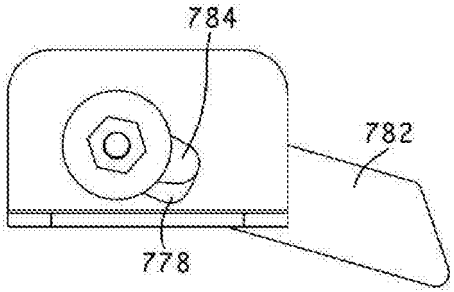


Fig. 83

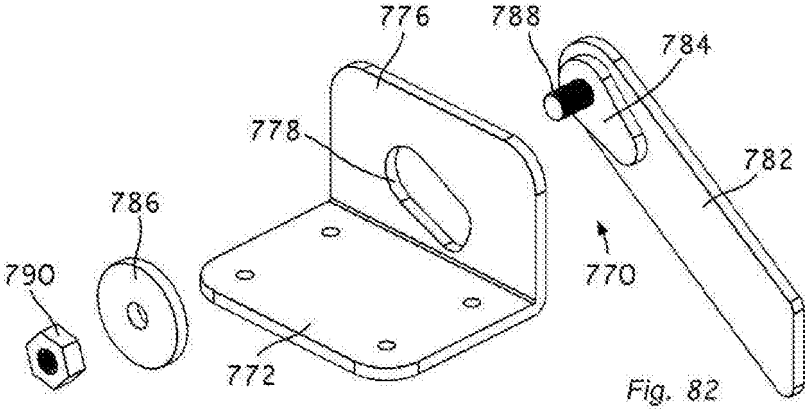
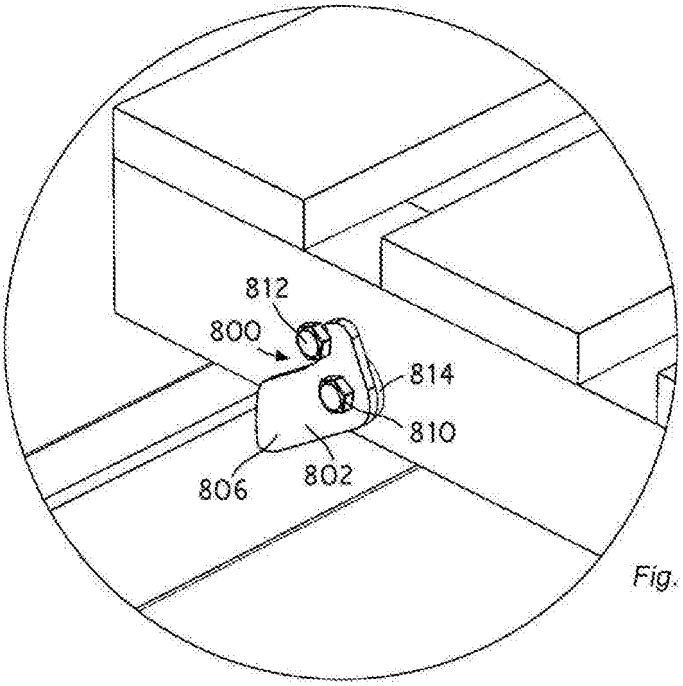


Fig. 82



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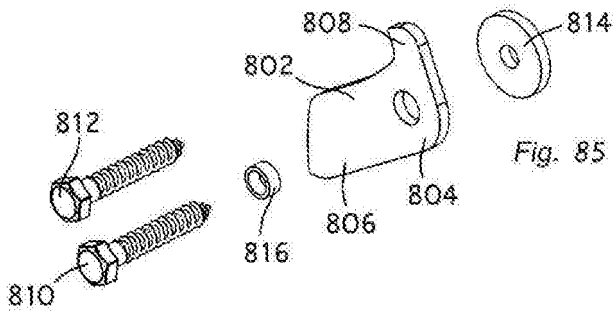

Fig. 85

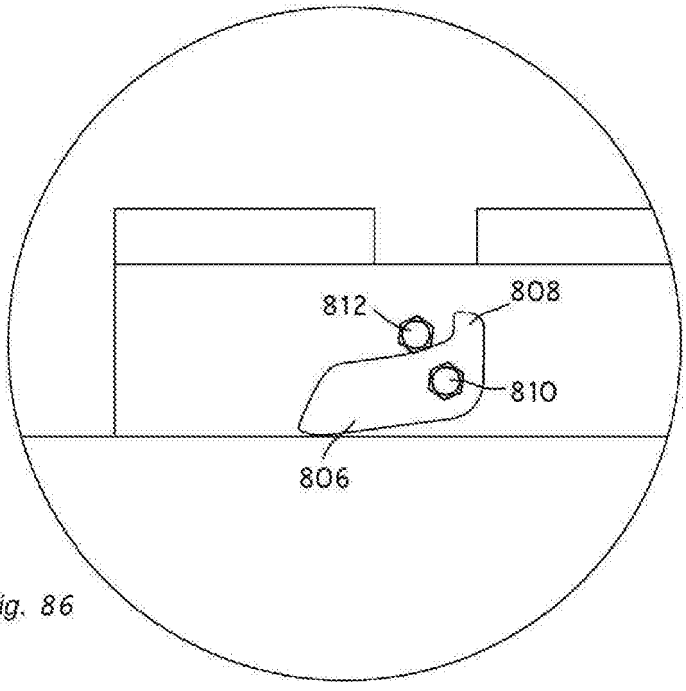

Fig. 86

Title: Pallet Attachment

Field of the Invention

This invention relates to a stop device for being attached to a portable goods platform such as a pallet.

Background to the Invention

Pallets and similar portable goods platforms are widely used for transport and storage of goods, with the pallets having openings for receiving lifting forks, e.g. of forklift trucks and other handling equipment, for lifting and movement of the pallets and goods carried thereon. Goods on pallets are commonly stored on elevated shelves of racking, including solid shelves and openwork racking with beams or bars defining shelves.

Problems can arise in practice, with pallets and the like inadvertently being dislodged or becoming unstable and falling from elevated shelves, with potential dangerous consequences. In particular problems can arise in the following circumstances:

1. Pallets may be accidentally pushed or pulled off an elevated shelf as a result of misaligned forks of a forklift truck missing the pallet openings and instead contacting the pallet end and pushing the pallet with respect to the shelf. This is illustrated in Figure 1, which shows a pallet 10 located on a shelf defined by cross beams 14 secured to upright beams 15 of racking 16. The forks 18 of a forklift truck 20 are shown engaging the front face of the pallet, rather than entering into pallet openings 24, and pushing the pallet in the direction of arrow X. The direction of movement of forks when manipulating a pallet onto and off racking is referred to herein as the "fork direction". The pallet may be dislodged from the shelf, with the pallet and goods (not shown) carried thereby falling to the ground, with risk of damage to the goods, pallet and racking and possibly injury to nearby personnel.

2. If pallets are stored incorrectly on racking shelves, e.g. in the incorrect orientation or with excessive overhang, they may become unstable, with the risk of pallets falling and racking collapsing. This is a particular hazard with oversized pallets.

3. Earthquakes and other vibrations may cause movement of pallets with respect to shelves, again with the risk of instability, falling and collapse.

The present invention aims to address these problems.

Summary of the Invention

In one aspect, the present invention provides a stop device for attachment to a portable goods platform, for preventing inadvertent dislodging of the platform when located on an elevated shelf of racking, including shelves defined by racking beams, the device comprising a securing arrangement adapted to be fixed with respect to the platform, and a moveable member fixed with respect to the securing arrangement for movement, in use, between a release position in which it does not impede location of the platform on a horizontal ground surface and a blocking position in which a part of the moveable member abuts or is aligned with part of the racking when the platform is located on a shelf of the racking, to prevent relative horizontal movement of the platform with respect to the racking, the device being such that when fixed to a platform the moveable member is automatically moved to the release position when the platform is located on a horizontal surface and is automatically moved to the blocking position when the platform is located above a horizontal surface.

In use, the device is fixed to a platform via the securing arrangement thereof, typically in permanent or semi-permanent manner, e.g. by use of screws, adhesive, welding, friction fit etc., so that the device is securely fixed to the platform and cannot be removed unintentionally.

The device does not interfere with normal handling and use of the platform, which can be placed on a horizontal surface, e.g. ground surface, stacked when unloaded (with

the moveable member automatically moving to the release position in which this is unimpeded), loaded with goods, picked up and moved e.g.by a forklift truck or other handling device, and placed on racking shelves etc. in conventional manner.

In the release position, the moveable member generally does not extend below the platform lower surface, although it is possible for the member to protrude slightly below the platform lower surface provided this does not adversely affect handling. Thus, in the release position the moveable member does not extend significantly below the platform lower surface.

When the platform is lifted up, with the bottom surface horizontally spaced from a horizontal surface, the moveable member automatically moves to the blocking position, typically under the action of gravity and/or by the action of resilient means such as a spring. In this position, part of the moveable member extends vertically below the bottom surface of the platform (by an amount referred to as "the member effective height"). When the platform is correctly located on a shelf of racking, with parts of the bottom surface of the platform supported on the shelf, and the moveable member unsupported by the shelf, the moveable member adopts the blocking position in which it can abut part of the racking so as to prevent relative horizontal movement of the platform with respect to the racking, thus preventing inadvertent dislodging of the platform.

The device of the invention can thus assist in retention of a pallet on a shelf of racking and reduce the risk of inadvertent dislodging, e.g. in the circumstances discussed above.

The device can also act as a guide, assisting an operator in correctly and accurately locating a platform on a shelf, thus facilitating ease and speed of handling.

The device of the invention may be used with a wide range of portable goods platforms, including pallets, skids and stillages, which may be made e.g. of wood, metal, plastics, etc., particularly those designed to be lifted by the forks of a forklift

truck or other lifting device but also including bins, baskets etc. intended to be manually manipulated.

A pallet typically comprises an upper load-carrying deck comprising an array of parallel, spaced apart boards, usually with a lower deck of boards.

The decks may be separated by a series of blocks at the corners and centres of the sides, with intervening transversely oriented stringer boards between the lower face of the upper deck and the blocks. Such pallets are known as block pallets, with Euro pallets being an example of block pallets. Figures 2 and 3 show a typical Euro pallet 40, with upper deck boards 42, lower deck boards 44, blocks 46, stringer boards 48, and fork openings 50. In this pallet, the deck boards extend from front to rear, being aligned with the fork direction, but the boards may be transversely oriented. Side openings 52 are also present. The pallet is shown resting on cross beams 60 of racking.

The upper deck may alternatively be carried on transversely extending boards or beams, known as stringers, possibly with a lower deck below. Pallets without a lower deck are sometimes referred to as skids. Figures 4 and 5 show a typical stringer pallet 70 comprising upper deck boards 72 and stringer beams 78 with fork openings 80, resting on racking cross beams 60. Cutouts (not shown) may optionally be provided in the side edge for optional side entry of lifting forks.

A stillage includes an upper framework, possibly with sides. Figure 6 shows a typical metal stillage 90, comprising an array of connected bars 92 defining an openwork upper deck, with bars 94 defining a lower deck. Corner uprights 96 define an open upper cage. A single, wide fork opening 98 is between the decks, with additional side openings 100. The stillage is shown resting on racking cross beams 60.

For brevity, all such platforms may be referred to as a "pallet" herein, and where appropriate references to a "pallet" should be interpreted accordingly.

The device can be fixed to the platform in a number of possible different positions, as will be discussed in more detail below, depending on the construction of the device and platform. Typically the device will be fixed at or near side or end portions of the platform, e.g. being mounted to a lower deck board, corner block, stringer board, upper deck board etc. Commonly, a device will be mounted at a side of the platform, with devices best being used in pairs, one at each side of the platform. Centre mounting of a single device is also possible. Suitable positioning can be readily determined, to enable functioning as a stop device without impeding normal handling of the platform.

The racking typically has one or more elevated shelves for storage of pallets carrying goods, with the pallets commonly being moved onto and off the shelves by a forklift truck or similar handling equipment. The shelves may be solid or of openwork construction, with an array of beams or bars defining the shelves, possibly carrying a mesh. Typical openwork racking 16 is shown in Figure 1.

Most racking beams and shelves in current usage have rounded edges, so in this case it is desirable for efficient functioning for the moveable member in the blocking position to contact the racking in a region that is lower than the top rounded edge and higher than the bottom rounded edge to prevent slipping.

The vertical distance between the platform base and the lowermost part of the moveable member when in the blocking position, i.e. the member effective height, should be as small as possible, while nevertheless permitting efficient functioning, for ease of handling of the pallet. For example, the moveable member should ideally not extend below the shelf to avoid possibly obstructing loading and unloading pallets on a shelf below. This also avoids the need for the pallet to be lifted by a large amount to provide vertical clearance.

In particular, the member effective height is preferably between 20 to 50mm, so that the overlap of the arm with the shelf is sufficiently great to prevent slippage while not being so large as to add unnecessarily to the height of the pallet and so impede handling.

The securing arrangement and moveable member are interconnected by a suitable linkage. Suitable linkages include a sliding linkage, with the securing arrangement and moveable member arranged for linear movement with respect to each other, and a pivoting (or rotary) linkage, with the components arranged for rotary movement with respect to each other about a pivot axis. A combination of sliding and pivoting linkage is also possible. One or more rollers may be provided on the securing arrangement and/or moveable member to aid movement.

The securing arrangement is typically rigidly fixed with respect to the platform in use, so the moveable member describes linear and/or rotary movement with respect to the securing arrangement and platform in operation. This is conveniently achieved e.g. by use of mounting screws etc.

The securing arrangement commonly comprises a mounting plate for securing to a pallet, and carrying a pivot arrangement component for embodiments employing a pivoting linkage, or carrying a guide arrangement component for embodiments employing a sliding linkage. A mounting plate can assist in fitting of a device to a platform, and in providing good performance and reliability of the device. However, in some cases it may be possible to omit the plate, with the moveable member being pivotally or slideably mounted directly on the pallet, e.g. via an opening in the pallet or via a securing arrangement comprising a tubular member, e.g. using a nut and bolt.

In embodiments having a sliding linkage the securing arrangement may comprise a structure (commonly carried on a mounting plate) providing one or more guide openings, guide slots or guide tubes defining a vertically extending opening, for slideably receiving a moveable member for limited sliding movement, typically in a vertical direction, between release and blocking positions. For example, the stop device may comprise a mounting plate carrying two guide tubes vertically oriented (in use) for receiving an inverted U-shaped member. The stop device may alternatively comprise a threaded guide tube for receiving a threaded rod. As a further possibility, a mounting plate defining an elongate slot or slots (with the slot possibly defined by protrusions, such as pegs) may receive a slideable plate member. The securing

arrangement may alternatively include one or more guide pegs for cooperation with an elongate slot or slots in a moveable member of plate-like configuration. Many other possibilities may also be envisaged. One or more rollers may be attached to the securing arrangement and/or moveable member to aid movement.

In embodiments employing a pivoting (or rotary) linkage, the securing arrangement and moveable member typically have a cooperating opening and projection (shaft) pivotally interconnected to form the pivoting linkage. In a simple case, the opening and projection are of circular cross section and define a pivot axis passing through the centres thereof. However, more complex arrangements, with multiple or elongate openings and multiple projections, can also be used, with more complex pivoting movement occurring. In general, either the opening or openings can be located on the securing arrangement, with the projection or projections on the moveable member, or vice versa.

Thus, the securing arrangement may comprise one or more openings e.g. in a mounting plate or a structure carried by a mounting plate, for cooperation with a pivot projection, e.g. pivot pin or shaft, of a moveable member. The securing arrangement may alternatively comprise one or more pivot projections (e.g. pivot pins) e.g. fixed with respect to a mounting plate or a structure carried thereby, for cooperation with an appropriate opening or openings of a moveable member. Alternatively or additionally, the securing arrangement and moveable member may be held in loose association, with a degree of play therebetween being possible, moveable in constrained manner (typically by suitable guide elements) to define a virtual pivot axis.

The openings can be in the form of one or more circular or tubular openings in a structure carried by a mounting plate, to define a pivot axis that may be parallel to and spaced apart from the mounting plate or perpendicular to the mounting plate. The reverse arrangement, with the opening or openings on the moveable member, is also possible.

The openings can be in the form of one or more elongate slots in a structure carried by a mounting plate, with a cam on a portion of the moveable member passing through the slot limiting possible pivoting movement, and so acting as a stop. The reverse arrangement is also possible.

The openings can be in the form of two or more elongate slots or one or more curved slots that interact with two or more projections e.g. pins on the moveable member in such a way as to permit both relative rotational and sliding movement, defining a virtual pivot axis. The reverse arrangement is also possible.

The openings can alternatively be in the form of one or more cutouts in a structure or structures carried by the mounting plate, with a cooperating moveable member constrained to move so as to define a virtual pivot axis.

In the case of embodiments employing one or more pivot pins, fixed with respect to the securing arrangement, these can be fixed either to a mounting plate or a structure carried thereby. The moveable member can be pivotally connected to one or more such pins, for pivoting about a pivot axis passing through the pin or aligned pins, e.g. parallel to and spaced apart from the mounting plate. Alternatively, a pivot pin can act as a surface around which a moveable member pivots in constrained manner around a virtual pivot axis, parallel to and spaced apart from the axis of the pin.

As noted above, there may be a degree of play possible between the securing arrangement and the moveable member, with these components loosely interconnected to each other. Both relative pivoting and sliding movement between the components may be possible, defining a virtual pivot axis. Movement is generally constrained by the geometry of the components, acting to guide and limit possible movement. Such loose interconnection may be possible e.g. by use of a suitable elongate or curved openings and/or suitable guide arrangements and movement limiters. Such arrangements have benefits of ease of constructions and assembly.

In embodiments employing a pivoting linkage, the securing arrangement need not comprise a mounting plate. Instead, the securing arrangement may, e.g., comprise a

tubular member adapted to be fixed with respect to a platform, e.g. mounted to a surface of a pallet, passing into or through the pallet, for cooperation with a pivot projection, e.g. pivot pin, of a moveable member.

Depending on the construction, the stop device may be intended to be used on a pallet with the pivot axis transverse to, e.g. typically perpendicular to, the direction of fork movement of a forklift truck or other lifting device when manipulating the pallet onto and off the racking (the fork direction), or with the pivot axis typically parallel to the fork direction.

The extent of permissible pivoting is typically in the range 10 to 60°, e.g. 15 to 45°.

The angle between horizontal and a line joining the pivot axis and the bottom of the moveable member in the blocking position is preferably at least about 35°, more preferably at least about 45° for reliability of functioning in terms of movement from the blocking to the release position (in the absence of means such as a roller for aiding such movement).

In the case of a multi-component securing arrangement, the components may be integrally formed or attached to each other, as appropriate.

The moveable member is typically of elongate form, and may comprise of one or more elongate members or arms. The moveable member may be of general planar configuration (possibly angled to have portions in different planes), or may include a portion of generally planar configuration, typically with straight edges. A planar portion of the moveable member may be substantially aligned with (e.g. being flush with) the bottom surface of the platform when in the release position, or a planar portion may be parallel to and below (typically slightly below) the bottom surface of the platform when in the release position. The moveable member may alternatively be of rod-like form (e.g. having a generally circular, oval, square or rectangular cross section), of straight or bent configuration, possibly of generally U-shaped or V-shaped configuration. A member of rod-like form or bent configuration may be produced e.g. by bending a rod or by cutting from a plate.

The moveable member may be rigid, or have some degree of flexibility. Rod-like moveable members may, for example, comprise a fully or partly flexible shaped rod, possibly mounted on a stiff ring. A moveable member with a degree of flexibility can assist in clamping a platform to racking, as discussed below. Alternatively, clamping using a rigid moveable member is possible due to the inherent flexibility of racking cross beams.

The moveable member may include at least two surfaces that, in use, are oriented generally horizontally and vertically when the member is in the blocking position, for engaging horizontal and vertical surfaces of racking, e.g. an upper and a side surface of a bar of openwork racking. The moveable member may be adapted, in use, to press against a racking beam or shelf to prevent movement of the platform in any horizontal direction. In this way, the device (and platform) may be effectively clamped or secured to the racking, if the pallet carries two or more suitably located devices in accordance with the invention, acting to impede movement in all horizontal directions. With such embodiments it is possible to locate undersized platforms on racking beams.

There should ideally be little or no unwanted movement between the components of the stop device, for reliability of functioning. However, there may be a degree of resilience, to provide a shock-absorbing function when the moveable member contacts racking. This can be achieved, e.g. by use of a moveable member with a degree of resilience or flexibility, as discussed above, or by incorporating a resilient or flexible element, e.g. a rubber or spring element on the moveable member or securing arrangement.

In certain embodiments intended for use with a pivot axis thereof generally aligned with the fork direction, the moveable member conveniently comprises an angled member having an upper portion in a generally vertically or horizontally oriented plane in the blocking position, with a lower portion in a plane inclined with respect to the upper portion. Such members may comprise, e.g., angled planar portions or an angled rod-like member.

The moveable member preferably has one or more surfaces that, in use, are oriented generally vertically when the member is in the blocking position, for engaging vertical surfaces of racking, e.g. one or both vertical faces of a bar of openwork racking.

The moveable member may comprise a single member, e.g. elongate arm, or may have multiple components suitably interconnected. For example, the moveable member may comprise two elongate members or arms, each pivotally mounted with respect to the securing arrangement, with the remote ends of the members linked, e.g. by a sliding connection or parallel rule linkage. Such arrangements function to limit possible movement of the moveable member, thus acting as a stop to define the blocking position.

The moveable member may include a rounded portion or roller for ground-engagement, e.g. at the distal end of the member, to facilitate sliding or rolling movement over a horizontal surface, for instance to facilitate movement from the blocking position to the release position.

The device may include stop means to limit relative movement of the moveable member, and define the blocking position. For example, part of the moveable member may be moved into contact with part of the securing arrangement or part of the platform to limit movement, or the construction of the moveable member and/or linkage may be such a to permit a limited degree of movement, such as with multiple-component arms as discussed above.

In order to locate a platform with associated device or devices into position on a racking shelf (racking beams or solid shelf), it is generally necessary to lift the platform vertically by a suitable distance so the moveable member is vertically spaced from the shelf, i.e. by more than the member effective height. The platform can then be moved in an input direction and located in appropriate position over the shelf and lowered.

In order to remove the platform it is generally necessary to lift the platform vertically by a suitable distance so the moveable member is vertically spaced from the shelf, i.e.

by more than the member effective height. The pallet can then be moved horizontally in a withdrawal direction for removal.

In some embodiments, the moveable member in the blocking position, in use, abuts or is aligned with the front vertical face of a rear racking beam. With such embodiments, it is possible for the pallet to be removed from racking in the removal direction, with little or no clearance between the platform and shelf (for example being lifted only slightly by a forklift truck), with the moveable member being automatically moved to the release position on contact with the front racking beam. This is the case, e.g., with simple pivoting member arrangements and many others. To facilitate such movement, a relevant face of the moveable member may be inclined with respect to horizontal for ease of engagement with a front racking beam.

In some embodiments, the moveable member in the blocking position acts as a one-way stop capable of preventing relative horizontal movement of the pallet in one direction only, typically the input direction.

In some embodiments the moveable member in the blocking position acts as a two-way stop, capable of preventing relative horizontal movement of the platform with respect to the racking in either direction (both the input and withdrawal directions).

The stop device may include resilient means, such as a spring, for urging the moveable member to the blocking position. This may assist reliable functioning and be of benefit, particularly with devices intended for use on pallets to be used in demanding environmental conditions such as cold conditions, e.g. for chilled or frozen storage of goods.

The components of the stop device are conveniently made of metal, plastics or composite materials, and the device should be sufficiently robust to withstand the forces to which it is likely to be exposed in use.

As will be apparent, the stop device can have a wide variety of possible constructions. For any particular situation it is possible to select devices of suitable construction,

having regard to factors such as the type and condition of the platform, the construction of racking with which it is intended for use, the type and weight of goods with which it is intended for use, environmental conditions of intended use, forces to which it will be subject, etc.

In a further aspect, the present invention provides a portable goods platform with at least one stop device attached thereto for preventing inadvertent dislodging of the platform when located on an elevated shelf of racking, the or each device comprising a moveable member fixed with respect to the platform for movement, in use, between a release position in which it does not impede location of the platform on a horizontal surface and a blocking position in which a part of the moveable member abuts or is aligned with part of the racking when the platform is located on a shelf of the racking, to prevent relative horizontal movement of the platform with respect to the racking, the device being such that the moveable member is automatically moved to the release position when the platform is located on a horizontal surface and is automatically moved to the blocking position when the platform is located above a horizontal surface.

The or each device preferably also comprises a securing arrangement as discussed above.

The invention also covers a portable goods platform with one or more stop devices in accordance with the invention attached thereto.

Optional and preferred features of the stop device, components thereof and functioning thereof are discussed above in connection with the device aspect.

Platforms with stop device(s) intended for engagement with the front or rear outside faces of a shelf (i.e. the extreme front surface or extreme rear surface) can be used with racking shelves of either solid construction or formed of beams. Platforms with stop device(s) intended for engagement with the rear face of a racking front beam or front face of a racking rear beam can, however, only be used with shelves formed of beams and not those of a solid construction.

The platform may have two or more stop devices (of similar or different construction) attached thereto, e.g. one or near at each front or rear corner of the platform in the direction of insertion to racking. Additionally or alternatively, a single stop device may be secured in the centre front, or rear centre. Using stop devices that, in use, engage with opposite vertical faces a racking beam(s) or shelf, it may be possible to clamp or firmly fix the platform to racking, preventing movement in any horizontal direction. This is of particular benefit for devices for use in areas prone to earthquakes, for instance.

Using stop devices that, in use, engage with opposite vertical sides of racking beam(s) or shelf, it may be possible to clamp or firmly fix the platform to racking, preventing movement in any horizontal direction.

Devices should be attached to the platform such in a way as to allow the platform to be aligned with racking, with either a minimum of one centre mounted device or a minimum of two side mounted device for best functioning.

Embodiments of the invention will be described, by way of illustration, with reference to the accompanying drawings, in which:

Figure 1 illustrates a conventional pallet on a shelf of racking, with a forklift truck, with Figure 1A being an enlarged scale detail;

Figure 2 is a perspective view of a conventional Euro pallet located on racking beams;

Figure 3 is an underside perspective view of the pallet of Figure 2 located on racking beams;

Figure 4 is a perspective view of a conventional stringer pallet located on racking beams;

Figure 5 is an underside perspective view of the pallet of Figure 4 located on racking beams;

Figure 6 is a perspective view of a conventional stillage located on racking beams;

Figure 7 is a perspective view of a first embodiment of stop device in accordance with the invention attached to a pallet located on racking beams;

Figure 8 is a side view of the device of Figure 7, with the moveable member in the release position;

Figure 9 is a side view of the device of Figure 7, with the pallet located on racking beams, with the moveable member in the blocking position;

Figure 10 is a view similar to Figure 9 showing the full pallet;

Figure 11 is a perspective view from below of the arrangement shown in Figure 10;

Figure 12 is a view similar to Figure 9, with the pallet raised above the racking beams;

Figure 13 is a view similar to Figure 10 illustrating removal of a pallet from racking, with the pallet moving from the position shown in dashed lines to the position shown in full lines;

Figure 14 is a view similar to Figure 10, illustrating an additional device;

Figure 15 is a perspective view illustrating a further embodiment of stop device in accordance with the invention attached to a pallet located on racking beams, with Figure 15A being an enlarged scale detail;

Figure 16 is a perspective view illustrating a further embodiment of stop device in accordance with the invention attached to a pallet located on racking beams, with Figure 16A being an enlarged scale detail;

Figure 17 is a perspective view of the device of Figure 16;

Figure 18 is a perspective view illustrating a further embodiment of stop device in accordance with the invention attached to a stillage located on racking beams, with Figure 18A being an enlarged scale detail;

Figure 19 is a perspective view of the device of Figure 18;

Figure 20 is a perspective view illustrating a further embodiment of stop device in accordance with the invention attached to a pallet located on racking beams, with Figure 20A being an enlarged scale detail;

Figure 21 is a perspective view illustrating a further embodiment of stop device in accordance with the invention attached to a pallet located on racking beams, with Figure 21A being an enlarged scale detail;

Figure 22 is a perspective view illustrating a further embodiment of stop device in accordance with the invention attached to a pallet located on racking beams, with Figure 22A being an enlarged scale detail;

Figure 23 is a perspective view of Figure 22;

Figure 24 is a perspective view illustrating a further embodiment of stop device in accordance with the invention attached to a stillage located on racking beams, with Figure 24A being an enlarged scale detail;

Figure 25 is a perspective view of the device of Figure 24;

Figure 26 is a perspective view illustrating a further embodiment of stop device in accordance with the invention attached to a stillage located on racking beams, with Figure 26A being an enlarged scale detail;

Figure 27 is a perspective view illustrating another embodiment of stop device in accordance with the invention attached to a pallet located on racking beams;

Figure 28 is an enlarged scale perspective view of the device of Figure 27;

Figure 29 is a perspective view illustrating a further embodiment of stop device in accordance with the invention attached to a pallet located on racking beams, with Figure 29A being an enlarged scale detail;

Figure 30 is a perspective view of the device of Figure 29;

Figure 31 is a perspective view illustrating a further embodiment of stop device in accordance with the invention attached to a pallet located on racking beams, with Figure 31A being an enlarged scale detail;

Figure 32 is a perspective view of the device of Figure 31;

Figure 33 is a perspective view illustrating a further embodiment of stop device in accordance with the invention attached to a pallet located on racking beams, with Figure 33A being an enlarged scale detail;

Figure 34 is a perspective view illustrating a further embodiment of a stop device in accordance with the invention attached to a pallet located on racking beams, with Figure 34A being an enlarged scale detail;

Figure 35 is an underside perspective view illustrating a further embodiment of stop device in accordance with the invention attached to a pallet located on racking beams, with Figure 35A being an enlarged scale detail;

Figure 36 is an underside perspective view illustrating a further embodiment of stop device in accordance with the invention attached to a pallet located on racking beams, with Figure 36A being an enlarged scale detail;

Figure 37 is a perspective view of the device of Figure 36;

Figure 38 is a perspective view illustrating a further embodiment of stop device in accordance with the invention attached to a pallet located on racking beams, with Figure 38A being an enlarged scale detail;

Figure 39 is a side view showing the device of Figure 38 in the blocking position;

Figure 40 is a side view showing the device of Figure 38 in the release position;

Figure 41 is a perspective view illustrating a further embodiment of stop device in accordance with the invention attached to a pallet located on racking beams, with Figure 41A being an enlarged scale detail;

Figure 42 is a perspective view illustrating a further embodiment of stop device in accordance with the invention attached to a pallet located on racking beams, with Figure 42A being an enlarged scale detail;

Figure 43 is a perspective view illustrating a further embodiment of stop device in accordance with the invention attached to a pallet located on racking beams;

Figure 44 is a perspective view of the device of Figure 43;

Figure 45 is a side view showing the device of Figure 43 in the blocking position;

Figure 46 is a side view showing the device of Figure 43 in the release position;

Figure 47 is a perspective view illustrating a further embodiment of stop device in accordance with the invention attached to a pallet located on racking beams, with Figure 47A being an enlarged scale detail;

Figure 48 is a side view showing the device of Figure 47 in the release position;

Figure 49 is a perspective view illustrating a further embodiment of stop device in accordance with the invention attached to a pallet located on racking beams, with Figure 49A being an enlarged scale detail;

Figure 50 is a perspective view illustrating a further embodiment of stop device in accordance with the invention attached to a stillage located on racking beams, with Figure 50A being an enlarged scale detail;

Figure 51 is a perspective view illustrating a further embodiment of stop device in accordance with the invention attached to a pallet located on racking beams, with Figure 51A being an enlarged scale detail;

Figure 52 is a perspective exploded view of the device of Figure 51;

Figures 53 to 58 illustrate the device of Figures 51 and 52 in various different conditions;

Figure 59 is a perspective view illustrating an alternative mounting option for the device of Figures 51 and 52;

Figure 60 is a perspective view illustrating a further embodiment of stop device in accordance with the invention attached to a pallet located on racking beams, with Figure 60A being an enlarged scale detail.

Figure 61 is a side view of a further embodiment of stop device in accordance with the invention in the blocking position, shown attached to a pallet located on racking beams;

Figure 62 is similar to Figure 61 with parts omitted;

Figure 63 is similar to Figure 62 but with the device in the release position;

Figure 64 is an exploded perspective view of a further embodiment of stop device in accordance with the invention;

Figure 65 is a perspective view of a further embodiment of a stop device in accordance with the invention attached to a pallet located on racking beams;

Figure 66 is a perspective view from the rear of the device of Figure 65, in the blocking position;

Figure 67 is a rear side view of the device of Figures 65 and 66, in the release position;

Figure 68 is a perspective view of a further embodiment of stop device in accordance with the invention attached to a pallet located on racking beams;

Figure 69 is a perspective view of the device of Figure 68, in the blocking position;

Figure 70 is a view similar to Figure 69, showing the device in a release position;

Figure 71 is an exploded perspective view of the device of Figures 68 to 70;

Figure 72 is a front view of the device of Figures 68 to 71 in the release position;

Figure 73 is a perspective view of a further embodiment of a device in accordance with the invention, in the blocking position;

Figure 74 is a view similar to Figure 73 showing the device in the release position;

Figure 75 is a perspective view of a further embodiment of stop device in accordance with the invention, in the blocking position;

Figure 76 is an exploded perspective view of the device of Figure 75;

Figure 77 is a side view of a further embodiment of stop device in accordance with the invention, in the blocking position attached to a pallet located on racking beams;

Figure 78 is an exploded perspective view of the device of Figure 77;

Figure 79 is a view similar to Figure 77, showing the device in the release position;

Figure 80 is a perspective view of a further embodiment of stop device in accordance with the invention, in the blocking position, shown attached to a pallet located on racking beams;

Figure 81 is a perspective view of the device of Figure 80 from the other side;

Figure 82 is an exploded perspective view of the device of Figures 80 and 81;

Figure 83 is a side view of the device of Figures 80 to 81 in the release position;

Figure 84 is a perspective view of a further embodiment of stop device in accordance with the invention, in the blocking position, shown attached to a pallet located on racking beams;

Figure 85 is an exploded perspective view of the device of Figure 84; and

Figure 86 is a side view of the device of Figures 84 and 85 in the release position.

Detailed Description of Embodiments

Figures 7 to 12 illustrate a stop device 200 in accordance with the invention, having a pivoting linkage. Device 200 comprises a moveable member in the form of an elongate arm 202 and a securing arrangement comprising a mounting plate 204 and associated components for pivotal connection of the arm 202 thereto. The arm 202 is of elongate planar configuration, with a circular opening near one end thereof. The

mounting plate 204 has four mounting holes for attachment of the device to a pallet 210 by means of four screws 206. The plate 204 has an integrally formed upstanding limb 212 with a circular opening therein through which the arm and plate are pivotally interconnected by means of rivet 214. The arm includes a flange 216 that overlaps part of the limb 212 to act as a stop, limiting possible pivoting movement of the arm.

The device 200 is shown attached to the outer edge of an outer lower deck board 220 of Euro pallet 210, near a front corner thereof, with the pallet shown supported on cross beams 230, 232 of an upper shelf of racking 234. The remainder of the racking is omitted for clarity.

The arm is pivotable between a raised, release position, as shown in Figure 8, where the pallet 210 is shown resting on a horizontal ground surface 296, and a lowered, blocking position, as shown in Figures 7 and 9 to 12, when the moveable member is unsupported, in particular when the pallet 210 is correctly position on the racking beams 230, 232. The angle of pivoting is about 25° in the release position, the arm is inclined downwardly to an extent determined by contact of flange 216 with the upper surface of mounting plate limb 212. In this position, the free end face 203 of the arm is oriented vertically, and is shown abutting the inside front horizontal face 231 of the rear beam 230 of the racking. The arm extends vertically below the pallet by the arm effective height 236 (Figures 9 and 12). In this position, the engagement of the arm 202 and racking 234 acts to prevent the pallet from being moved rearwardly with respect to the racking, for example by being moved in the direction of arrow X for instance as a result of incorrect alignment of lifting forks, as a result of earthquake etc., thus reducing the risk of inadvertent dislodging of the pallet from the racking.

The arm is moved automatically from the release position of Figure 8 to the blocking position under action of gravity, on vertical lifting of the pallet, and is automatically moved back to the release position when supported e.g. by being placed on a horizontal ground surface 296. The device thus does not interfere with normal handling of the pallet, which can be stacked when unloaded etc.

In order to place the pallet on the racking shelf, the pallet is lifted in the normal way, e.g. by way of a forklift truck. The arm will move automatically to the blocking position, and the pallet can be located over the racking, provided the vertical clearance is greater than the arm effective height. The pallet can then be lowered towards a shelf, possibly before the pallet is located over rear beam 230, with rearwards movement of the pallet in this partially lowered condition continued. The device will automatically move to the blocking position, so the arm will be brought into contact with the rear beam 230 on continued rearwards movement of the pallet, providing for positive location of the pallet in the correct position and indicating this to the operator.

In order to remove the pallet, it is lifted and withdrawn in the usual way in the direction of arrow Y in Figure 13. With this embodiment used on openwork shelves, it is not necessary to lift the pallet so that it is spaced above the shelf by more than the effective arm height (as shown in Figure 12). Instead less clearance is needed because the inclined rear face 218 of the arm will eventually contact the inner face of front racking beam 232 as shown in full lines at the right-hand side of Figure 13, moving the arm to the release position to permit passage over the beam.

Figure 11 shows two similar stop devices 200, 200' attached to both front edges of pallet 210, device 200' being a mirror image of device 200.

Two further similar stop devices may be optionally mounted at the rear edges of the pallet, with one such additional device shown in Figure 14, suitably spaced for engagement with the inside rear face of front racking beam 232, to prevent movement in either horizontal direction. Slight clearance should be allowed, with the spacing between the devices being slightly less than the beam spacing.

The stop device 200 may optionally include a spring (not shown) extending between the lower end of the arm flange 216 and the plate 204, acting to urge the arm to the blocking position.

Figure 15 illustrates a further embodiment of stop device 240 in accordance with the invention, that is similar to the embodiment of Figures 7 to 14 but has a modified arm

242 with a downwardly extending hook portion 244 at the remote end thereof, with a surface 246 that is vertically oriented when the arm is in the blocking position for engagement with the outer front face of a shelf mounted on the cross beam. A mirror image device 240' is shown fixed to the rear corner of pallet 210, with the two devices 240 and 240' preventing movement of the pallet in forwards or rearwards direction with respect to the racking.

The stop device 250 illustrated in Figures 16 and 17 has a further modified arm 252, with a hook portion 254 with two vertically oriented surfaces 255, 256 for abutment to both the outer rear face 233 and inner front face 231 of rear beam 230 in the blocking position. The securing arrangement also differs from that of the earlier embodiments, having a vertically oriented mounting plate 258 with screw holes 259 for securing to the rear surface of pallet corner block 46.

The stop device 260 illustrated in Figures 18 and 19 is shown attached to the front of a side lower deck bar 94 of a metal stillage 90. The arm 262 is of bent T-shape with one limb having a vertically oriented portion 264 when the arm is in the blocking position for engagement with beam face 231, and an angled stop portion 266. The arm is pivotally mounted on the stillage 90 by means of a hole drilled through bar 94 using a securing arrangement comprising bolt 267 and nut 268 with spacing washer 269.

The stop device 270 show in Figure 20 is mounted to the front of a centre lower deck board 272 of Euro pallet 210. Mounting plate 274 has two upstanding limbs 275, 276 with aligned circular openings defining a pivot axis about which moveable member 278 is pivotable when secured thereto by means of aligned rivets 280, 281. The member 278 has two similar side elongate side arms 282, 283, one on each side of board 272, connected by cross piece 284 that acts as a stop.

Figure 21, illustrates a variant 290 of the Figure 20 embodiment, in which the moveable member 292 is formed of bent rod and is pivotally supported in a tubular housing 294 carried by plate 274.

Figures 22 and 23 illustrate a variant 300 of the device 250 of Figure 16, in which the moveable member 302 is made of bent rod and includes stop arm 304. The member 302 is pivotally supported in a tubular member 306 of the mounting arrangement that passes through a tubular hole formed in the pallet lower deck board 220, using nut 308 secured to an elongate arm of the member 302.

Figures 24 and 25 illustrate a variant 310 of the device 240 of Figure 15, with moveable member 312 made of bent rod, and pivotally supported in a tubular member 314 of the mounting arrangement secured with nut 316.

Figure 26 illustrates a further device 320 with a moveable member 322 of bent rod shown mounted for pivotal movement on the lower part of the front face of a corner upright 96 of metal stillage 90, defining a vertically oriented surface 324 for engagement with the outer front face of the front cross beam 232 of racking. The securing arrangement 326 in this case comprises a plate 328 welded to the stillage and carrying a tube 330 through which a limb of the member 322 passes, being secured in position by nut 332. A limb 334 of the member 322 acts as a stop.

The device 340 of Figures 27 and 28 is a variant of the device 200 of Figure 7, with moveable member 342 in the form of a bent rod with a coil portion 344 mounted for pivotal movement around a horizontal shaft 346 of the securing arrangement, extending between limbs 347, 348 upstanding from mounting plate 350. The member 342 includes a downwardly extending arm 352 with a bent end portion 354 for abutting the front face of racking rear cross beam 230. The coil 344 is resilient and permits a small deflection of arm 352.

Figures 29 and 30 illustrate device 360 that is broadly similar to the stop device 200 of Figures 8 to 14 but has a moveable member with two arms 362, 364 pivotally mounted to the securing arrangement, with the free ends connected by a pivotally mounted cross arm 366 to form a parallel rule linkage, in which pivoting movement of the two arms together is limited by the geometry of the arrangement. The securing arrangement comprises upper and lower mounting plates 368, 370 connected by upstanding side plate 372, with the upper plate 368 hinged to the side plate. The

arrangement includes an adjustable clamping nut 374 for fixing the securing arrangement in position, clamped between upper and lower deck boards 376, 378 of Euro pallet 210 by appropriate adjustment of the nut. The outer surfaces of the plates 368 and 370 have projections 382 for penetrating and gripping the pallet surface. The double arm arrangement is pivotally mounted to side plate 372. In the blocking position, as shown in Figure 29, the vertical front face of cross arm 366 contacts the inner front face 231 of a rear beam 230 of racking.

Figures 31 and 32 show a device 380 that is a variant of the device 360 of Figures 29 and 30, in which the cross arm 366' extends downwardly with a depending portion 382 for contact with a front face of a racking front or rear cross beam, being shown in contact with the outer front face of racking front cross beam 232. In this embodiment, the securing arrangement comprises a mounting plate 384 with four screw holes 386 for securing to the underside of upper deck board 376, with a downwardly depending side plate 388 to which the moveable member is pivotally attached.

Figure 33 shows a device 390 that is a further variant of device 360, with an inverted U-shaped member 392 carried by the pivoting arm arrangement of the moveable member, with vertical surfaces for contacting both the outer and inner faces 233, 231 of racking rear beam 230. The securing arrangement comprises a plate 394 mounted to a side beam 396 of a stringer pallet.

Figure 34 shows a device 400 that is a further variant of device 360 of Figures 29 and 30, in which the moveable member comprises two elongate, overlapping arms 402, 404 pivotally mounted on upstanding side plate 406 of the securing arrangement, with the lower ends of the arms pivotally connected in sliding manner by means of a pin 407 extending from arm 402 passing through an elongate slot 408 of arm 404 so that limited pivoting movement of the two joined arms is possible. The securing arrangement includes a mounting plate 410 with holes for mounting bolts. The device 400 is shown to be mounted to a lower deck board 378 of a Euro pallet adjacent a front corner thereof, so that when the moveable member is in the blocking position, as shown, the arm 404 can engage the inner front face 231 of a rear beam 230 of racking, although other mounting positions are also possible.

Figure 35 illustrates a device 420 designed to be mounted to the underside of a lower beam of a pallet, with the figures showing it mounted to the underside of a centre beam 422 of a stringer pallet 424. The securing arrangement of the device comprises a mounting plate 426 with screw holes to enable screw fixing to the pallet, with two depending side flanges 428 carrying a shaft extending along pivot axis 430 about which a planar moveable member 432 is mounted. In the blocking position shown in the figures, the end face 434 of the moveable member can abut the inner front face 231 of rear beam 230 of racking. In the retracted position (not shown) the member 432 pivots to be parallel to plate 426 and housed within recessed portion 436 of the beam 422 so as not to protrude below the pallet lower surface. The device will adopt this position when the pallet is located on a flat ground surface.

It is possible to omit the recess and mount the device on the pallet lower surface, as the protrusion below the pallet in the retracted position is negligible and does not adversely affect normal pallet handling.

Device 440 illustrated in Figures 36 and 37 is a variant of device 420 of Figure 35. Planar moveable member 442 has two upstanding side flanges 444 carrying a shaft 445 extending along pivot axis 446. In this embodiment, the securing arrangement comprises a tubular base member 448 that is mounted to pass through a tubular opening made through a stringer beam 450 of stringer pallet 424 at a front corner thereof. In the blocking position, as shown, the end face 452 of member 442 can abut the outer front face 454 of the front beam 232 of racking. In this case, the beam 450 is not cutaway to provide a recess for the member 442 in the retracted position, but recessing is an option. Two similar devices 440 are shown mounted to both front corners of the pallet 424 in Figure 36.

Figures 38 to 40 illustrate a device 460 shown mounted to a lower deck board of Euro pallet 210 adjacent a front corner thereof, arranged for pivoting movement of the moveable member about an axis aligned with the fork direction X. The securing arrangement comprises a base plate 462 with mounting holes to enable attachment by screws 464, and carries two upstanding tubular portions 466 aligned to define a pivot

axis 468. The moveable member comprises an upper planar portion 470 and a lower planar portion 472 inclined with respect to the upper portion. The angle between the bottom of the arm and the pivot axis is about 45°. The upper portion 470 carries a tubular extension 474, sized to fit between portions 466 for receiving a shaft passing along axis 468, through aligned portions 466 and 474 for pivotal mounting of the moveable member to the base plate 462. The lower planar portion 472 is of triangular configuration, having a front face 476 for engaging the inner front face 231 of a rear beam 230 of racking when in the blocking position, as shown in Figures 38 and 39, and an inclined rear face 478 that can engage the rear face of the front beam 232 on racking on removal of the pallet from racking and act to pivot the device to the release position, as shown in Figure 40. The device naturally adopts the release position when placed on a horizontal ground surface 479.

Figure 41 illustrates a device 480 that is a variant of device 460, having a base plate 482 designed to be mounted to the side of a pallet, with the figures showing two similar devices 480 mounted to a side board 488 of a stringer pallet 489. The moveable member has inclined upper and lower planar portions 484, 486 of rectangular configuration. The devices 460 are positioned for abutment with front and rear surfaces 231, 233 of a rear beam 230 of racking, preventing movement of the pallet in either horizontal direction.

Figure 42 shows a variant 490 of device 480, with moveable member having two similar lower planar portions 492 extending from a single upper planar portion 494.

Figures 43 to 46 illustrate another variant 500 of device 460, mounted to a side board 488 of a stringer pallet 489. The securing arrangement comprises a base plate 502 with mounting holes 504, carrying a tubular portion 506 for pivotally receiving a mounting arm of a bent rod moveable member 508. Member 508 includes an upper portion 510 and a lower portion 512 inclined thereto and carrying a roller 514 at the free end thereof, held in place by nut 516. The lower portion is positioned to abut the inner front face 231 of the rear beam 230 of racking when in the blocking position as shown in Figures 43, 44 and 45, and to hinge to the release position as shown in

Figure 46 when placed on a flat horizontal surface 518. Roller 514 facilitates such movement.

Figures 47 and 48 illustrate a device 520 in which the moveable member is arranged for linear movement. The securing arrangement comprises a mounting plate 522 with securing holes 523 and vertically extending tubular portions 524, 526. The moveable member 528 is of U-shaped configuration, with two limbs 530 connected by cross member 532. The member 528 is mounted with the limbs 530 passing through the tubular portions 524, 526. A spring 534 extends between cross member 532 and a mounting pin 536 and acts to urge the member 528 downwardly with respect to the securing arrangement, into the blocking position as shown in Figure 47. The device is shown mounted to the side of a corner block 46 of a Euro pallet. In the blocking position, the limbs 530 are adjacent the front and rear faces of a rear beam of racking, preventing movement of the pallet in either horizontal direction. The moveable member 528 will move upwardly relative to the mounting plate to a release position shown in Figure 48 on application of suitable upwards force to the member 528 to overcome the force of the spring 534 and gravity, e.g. when the pallet and device are placed on a flat ground surface 538.

Figure 49 illustrates another device 540 arranged for linear movement, in this case shown mounted to a side board 488 of a stringer pallet 498. The securing arrangement comprises a base plate 542 with mounting holes for attachment screws 544. The plate carries two vertically aligned pegs 546, with enlarged ends with the shafts of the pegs defining a vertical guide for a moveable member in the form of an elongate plate 548 with an elongate slot 550 designed to pass around the pegs 546. The plate 548 can move vertically with respect to the base plate 542 between a blocking position as shown, in which a side face of the plate 548 can abut an outer front face of the front beam 232 of racking, and a release position (not shown) in which U does not extend below the bottom of the pallet.

Figure 50 shows a device 550 mounted to a lower side beam 94 of a metal stillage 90. The securing arrangement comprises a base plate 552 with an upstanding limb 554 with a vertically extending slot 556 therein in which is slidably received a moveable

member in the form of an elongate plate 558 with upper stop flange 560. The plate 558 can move between a blocking position as shown, in which a side surface of plate 558 abuts the inner front face 231 of the rear beam of racking, and a release position (not shown).

Device 570 illustrated in Figures 51 and 52 has a planar mounting plate 572 with securing holes 574 and two protruding pins 576, 578. The moveable member 579 comprises a bent generally V-shaped member 580 having an upper limb 582 and a lower limb 584, each with an outwardly curving end portion 582a, 584a. The member 580 is mounted on pin 576 via a rigid bushing 586 and held in place with circlip 588. A bend 590 in the lower limb 584 passes around and abuts pin 578. The member 580 has a degree of flexibility. The member 580 is in the form of bent rod, but may alternatively be in the form of a shaped rigid plate.

Device 570 is shown mounted to a side face of a rear corner block 46 of a Euro pallet, with a mirror image device 570' mounted to the adjacent front corner block. The devices can pivot between a release position as shown in Figure 53, e.g. when the pallet is located on a ground surface 592, and lowered positions, including extended and active positions both of which are capable of constituting a blocking position.

Figure 54 shows the pallet in the air above racking beams 230, 232, with the members 579 dropped to the extended position. Figure 55 shows the pallet lowered to point where the top part of the members 579 contacts the top of the racking beams, and there is a gap between the side part of the members and the side of the racking beams, with the members still in the extended position. Figure 56 shows the pallet lowered further, with the members further rotated on contact with the racking beams to point where the top part of the members is still touching the top of the racking beams and side part of members is touching the side of the racking beams. The members are in full contact with the racking beams and there is a small gap (typically a few mm) between the bottom of the pallet and the top of the racking beams. Figure 57 shows the pallet fully lowered on the racking beams, with the pallet weight having caused the members to rotate further and flex. This tension applies pressure on the racking beams and prevents the pallet from moving in all horizontal directions. Figure 58 is

similar to Figure 56, but shows positioning where there are small gaps between the side parts of the members and the side of the racking beams. This configuration also prevents the pallet from moving in two horizontal directions, but does not involve pressure applied to the side of the racking beams. The clearance gap facilitates pallet location.

The device 570 of Figures 51 and 52 may alternatively be mounted for cooperation with the inner faces of racking beams, as shown in Figure 59, in this case shown mounted to a side board of a stringer pallet. In this way, it is possible to support undersized platforms on racking beams.

Figure 60 illustrates a variant 600 of the device 570, with mounting plates 602 carrying two similar members 579, 579' mounted in opposed directions, with the outer member 579' mounted on a slightly longer pin 576'.

Figures 61 to 63 illustrate device 610 comprising a planar base plate 612 mounted with screws 614 to a front corner block 46 and lower deck board of a Euro pallet 210. Two bolts 616, 618 are secured in cooperating threaded holes in the plate 612, each with part of the shaft 616', 618' protruding from the plate. The moveable member comprises an elongate, planar, T-shaped member 620, with a main limb 622 and two cross limbs 624, 626, with a cutout portion 628 in the upper portion of limb 622 adjacent limb 626 which is pivotally seated on shaft 618'. The member 620 can pivot around shaft 618' between a blocking position, as shown in Figures 61 and 62, in which the vertically oriented free end 630 of limb 622 can abut the inner front face 231 of racking rear beam 230, and a release position as shown in Figure 63, with movement of the member 620 constrained between shafts 616' and 618'.

Figure 64 illustrates a variant 640 of the device of Figures 61 to 63, using a shackle 642 in place of bolts 616 and 618 and with a slightly different shaped member 620.

Figures 65 to 67 illustrate device 650 having a L-shaped securing plate 652 with mounting holes 654 in base portion 656 and two elongate slots 658, 660 in upright portion 662 for slidably receiving elongate threaded projections 664, 666 from arm

member 668, held in place by nuts 664' and 666'. The device is shown mounted to a front portion of a lower deck board of a Euro pallet. The arm 668 is pivotable between a blocking position, shown in Figures 65 and 66, in which a vertically oriented free end of the arm member 668 can abut the inner front face 231 of a racking rear beam 230, and a release position as shown in Figure 67, with movement of the arm constrained by sliding movement of the projections 664, 666 in the respective slots 658, 660.

Figures 68 to 72 illustrate a device 670 comprising a mounting member 672 having a base plate 674 with fixing holes 675 and with two upstanding side walls 676, 678 each with a cutout portion 676', 678'. Moveable member 680 comprises an angled plate having an upper limb 682 with two rear protrusions 684, 686, and a downwardly depending lower limb 688. The members 672 and 680 are assembled with the protrusions 684, 686 received in cutouts 676', 678' and limb 688 extending downwardly with respect to member 672. The device 670 is secured to a front portion of the lower deck board of a Euro pallet as shown in Figure 68. The member 680 is pivotable about a virtual hinge defined between the protrusions and cutouts, between a blocking position as shown in Figures 68 and 69 and a release position as shown in Figures 70 and 72 e.g. when located on ground surface 690.

Figure 73 and 74 illustrate a variant 700 of the device 670 of Figure 68 to 72, intended to be used in the same way. In this embodiment a base plate 702 has two upstanding, slightly rearwardly inclined limbs 704, 706 defining an opening 708 therebetween. The moveable member 710 is of general similar form to member 680 but instead of protrusions 684, 686, it has two circular openings 712, 714 through which are passed bolts 716, 718 screwed into holes in base plate 702 for loose engagement of the plate 702 and member 710. The member is pivotable about virtual pivot axis created by the interaction of the openings 712, 714 and bolts 716, 718, between a blocking position as shown in Figure 73 and a release position as shown in Figure 74, with cutouts 720, 722 in a front part of the moveable member upper limb being guided to slide along the base limbs 704, 706.

Figures 75 and 76 illustrate a variant 730 of the device 700 of Figures 73 and 74. In this embodiment the moveable member 732 is loosely secured to the base plate 734 by a single bolt 736 which prevents unintentional removal of member 732. The base plate 734 has a curved rear flange 738 defining a slot 740 within which the rear of the moveable member 732 engages.

In the embodiments of Figures 61 to 76, there is a degree of play between the securing means and the moveable member.

Figure 77 to 79 illustrate a device 750 with a moveable member arranged for linear movement. The securing arrangement comprises a base plate 752 for screw fixing to a pallet, e.g. a front corner block 46 of a Euro pallet. The plate carries an internally threaded vertically extending tube that receives a correspondingly grooved blocking pin 756 constituting the moveable member. The threading is at an angle of about 45°. An upper shaft 758 of the pin 756 is secured to an outwardly extending flange 760 of the mounting arrangement, with a spring 762 therebetween, acting to urge the pin 756 downwardly to the blocking position as shown in Figure 77. The pin 756 can be moved upwardly to a release position, shown in Figure 79, with the pin rotating in the tube 754 and acting to compress spring 762.

Figures 80 to 83 illustrate a further device 770, arranged for pivoting movement. The securing arrangement comprises a base plate 772 with securing holes 774 and upstanding limb 776 with an elongate, inclined opening 778. The moveable member 780 comprises an elongate arm 782, the upper end of which carries a cam surface 784 sized to fit within opening 778 and to be held in place with washer 786 and threaded pin 788 and nut 790. The device is mounted to the lower deck board of a Euro pallet, near a front corner thereof. The arm 782 can pivot between a blocking position, as shown in Figure 80 and 81 and a release position, as shown in Figure 83 defined by engagement of cam surface 784 with opening 778.

Figures 84 to 86 illustrate a device 800 with pivoting moveable member 802 comprising an elongate arm 804 of generally L-shape configuration with a main blocking limb 806 and a short stop limb 808. The securing arrangement in this

embodiment does not comprise a mounting plate, but instead comprises two screws 810, 812 that can be secured directly to a pallet, e.g. to a front part of a side board of a Euro pallet, as shown in Figure 84, with a spacing washer 814 between the arm 804 and pallet with a mounting collar 816. The device can pivot between a blocking position, as shown in Figure 84, in which limb 808 abuts the shaft of screw 812, and a release position, as shown in Figure 86.

The components of the embodiments are typically made of metal, plastics or composite materials, and can be sized to suit the platform or platforms with which the device is intended for use.

Claims

1. A stop device for being attached to a portable goods platform, for preventing inadvertent dislodging of the platform when located on an elevated shelf of racking, including shelves of racking beams, the device comprising a securing arrangement adapted to be fixed with respect to the platform, and a moveable member fixed with respect to the securing arrangement for movement, in use, between a release position in which it does not impede location of the platform on a horizontal ground surface and a blocking position in which a part of the moveable member abuts or is aligned with part of the racking when the platform is located on a shelf of the racking, to prevent relative horizontal movement of the platform with respect to the racking, the device being such that when fixed to a platform the moveable member is automatically moved to the release position when the platform is located on a horizontal surface and is automatically moved to the blocking position when the platform is located above a horizontal surface.

2. A device according to claim 1, wherein the securing arrangement and moveable member are connected by a pivoting linkage.

3. A device according to claim 1 or 2, wherein the securing arrangement and moveable member are connected by a combined pivoting and sliding linkage.

4. A device according to claim 2 or 3, wherein the securing arrangement and/or moveable member comprise cooperating opening or openings and projection or projections.

5. A device according to claim 4, wherein the securing arrangement comprises one or more openings in the mounting plate or a structure carried by a mounting plate of the securing arrangement, and the moveable member comprises one or more cooperating projections.

6. A device according to claim 4, wherein the securing arrangement comprises one or more projections fixed with respect to the mounting plate or a structure carried

by the mounting plate of the securing arrangement, and the moveable member comprises one or more cooperating openings.

7. A device according to claim 4, 5 or 6 wherein the opening or openings are of circular or tubular form and define a pivot axis.

8. A device according to claim 7, wherein the pivot axis is parallel to and spaced apart from the mounting plate.

9. A device according to claim 7, wherein the pivot axis is perpendicular to the mounting plate.

10. A device according to claim 4, wherein the openings are in the form of one or more elongate slots in a structure carried by a mounting plate, with a cam on a portion of the moveable member passing through the slot limiting possible pivoting movement.

11. A device according to claim 4, wherein the openings are in the form of one or more slots in the moveable member, with a cam portion of the securing arrangement passing through the slot(s) limiting possible pivoting movement.

12. A device according to claim 4, wherein the openings are in the form of two or more elongate slots or one or more curved slots that interact with two or more projections in such a way as to permit both relative rotational and sliding movement, defining a virtual pivot axis.

13. A device according to claim 4, wherein the openings are in the form of one or more cutouts in a structure or structures carried by the mounting plate, with a cooperating moveable member constrained to move so as to define a virtual pivot axis.

14. A device according to claim 2 or 3, wherein the securing arrangement and moveable member are held in loose association, with a degree of play therebetween being possible, moveable in constrained manner to define a virtual pivot axis.

15. A device according to claim 2 or 3, wherein the mounting plate includes a pivot pin that acts as a surface around which a moveable member pivots in constrained manner around a virtual pivot axis.

16. A device according to claim 2, 3 or 4, wherein the securing arrangement comprises a tubular member adapted to be fixed with respect to a platform.

17. A device according to any one of claims 2 to 16 and intended for use with a pivot axis thereof generally aligned with the fork direction, wherein the moveable member comprises an angled member having an upper portion in a generally vertically or horizontally oriented plane in the blocking position, with a lower portion in a plane inclined with respect to the upper portion.

18. A device according to any one of claims 2 to 16, intended for use with a pivot axis thereof generally transverse to the fork direction.

19. A device according to claim 1, 2 or 3, wherein the securing arrangement and moveable member are connected by a sliding linkage.

20. A device according to claim 19, wherein the securing arrangement comprises one or more guide openings, guide slots or guide tubes defining a vertically extending opening, for slideably receiving a moveable member.

21. A device according to claim 19, wherein the securing arrangement comprises a threaded guide tube for receiving a threaded rod.

22. A device according to claim 19, wherein the securing arrangement includes one or more guide pegs for cooperation with at least one elongate slot in a moveable member of plate-like configuration.

23. A device according to any one of the preceding claims, where the moveable member is of elongate form.

24. A device according to claim 23, wherein the moveable member is of generally planar configuration or includes a portion of generally planar configuration.

25. A device according to claim 23 or 24, wherein the moveable member is of bent configuration.

26. A device according to claim 24 or 25, wherein a planar portion of the moveable member is substantially aligned with the bottom surface of the platform when in the release position.

27. A device according to claim 24 or 25, wherein a planar position of the moveable member is parallel to and below the bottom surface of the platform when in the release position.

28. A device according claim 23, wherein the moveable member is of rod-like form, of straight or bent configuration.

29. A device according to any one of the preceding claims, the moveable member has one or more surfaces that, in use, are oriented generally vertically when the member is in the blocking position.

30. A device according to any one of the preceding claims, wherein the moveable member includes at least two surfaces that, in use, are oriented generally horizontally and vertically when the member is in the blocking position.

31. A device according to claim 30, wherein the moveable member is adapted, in use, to press against a racking beam or shelf to prevent movement of the platform in any horizontal direction.

32. A device according to any one of the preceding claims, when the moveable member includes a rounded portion or roller for ground-engagement.

33. A device according to any one of the preceding claims, wherein one or more rollers are provided on the securing arrangement and/or moveable member to aid movement.

34. A device according to any one of the preceding claims, including stop means to limit movement of the moveable member with respect to the securing arrangement.

35. A device according to any one of the preceding claims, wherein the moveable member in the blocking position acts as a two-way stop.

36. A device according to any one of claims 1 to 34, wherein the moveable member in the blocking position acts as a one-way stop.

37. A device according to any one of the preceding claims, including resilient means, for urging the moveable member to the blocking position.

38. A device according to any one of the preceding claims, wherein the moveable member is resilient and/or comprises at least one resilient element for reducing the shock created when the moveable member abuts a shelf.

39. A device according to any one of the preceding claims, wherein the securing arrangement comprises at least one resilient or flexible element for reducing shock of the moveable member abutting a shelf.

40. A device according to any one of the preceding claims, wherein the moveable member comprises an inclined portion that aids movement to the release position when in contact with a generally vertical surface.

41. A portable goods platform with at least one stop device attached thereto for preventing inadvertent dislodging of the platform when located on an elevated shelf of

racking, the or each device comprising a moveable member fixed with respect to the platform for movement, in use, between a release position in which it does not impede location of the platform on a horizontal surface and a blocking position in which a part of the moveable member abuts or is aligned with part of the racking when the platform is located on a shelf of the racking, the device being such that the moveable member is automatically moved to the release position when the platform is located on a horizontal surface and is automatically moved to the blocking position when the platform is located above a horizontal surface.

42. A portable goods platform having attached thereto one or more stop devices in accordance with any one of claims 1 to 40.

Amendments top Claims have been made as follows

Claims

1. A stop device for being attached to a portable goods platform having openings for receiving lifting forks and being suitable for location on an elevated shelf of racking for storage, for preventing inadvertent dislodging of the platform when located on an elevated shelf of racking, including shelves of racking beams, the device comprising a securing arrangement adapted to be fixed with respect to the platform, and a moveable member fixed with respect to the securing arrangement for movement, in use, between a release position in which it does not impede location of the platform on a horizontal ground surface and a blocking position in which a part of the moveable member abuts or is aligned with part of the racking when the platform is located on a shelf of the racking, to prevent relative horizontal movement of the platform with respect to the racking, the device being such that when fixed to a platform the moveable member is automatically moved to the release position when the platform is located on a horizontal surface and is automatically moved to the blocking position when the platform is located above a horizontal surface.

2. A device according to claim 1, wherein the securing arrangement and moveable member are connected by a pivoting linkage.

3. A device according to claim 1 or 2, wherein the securing arrangement and moveable member are connected by a combined pivoting and sliding linkage.

4. A device according to claim 2 or 3, wherein the securing arrangement and/or moveable member comprise cooperating opening or openings and projection or projections.

5. A device according to claim 4, wherein the securing arrangement comprises one or more openings in a mounting plate or a structure carried by a mounting plate of the securing arrangement, and the moveable member comprises one or more cooperating projections.

6. A device according to claim 4, wherein the securing arrangement comprises one or more projections fixed with respect to a mounting plate or a structure carried by a mounting plate of the securing arrangement, and the moveable member comprises one or more cooperating openings.

7. A device according to claim 4, 5 or 6 wherein the opening or openings are of circular or tubular form and define a pivot axis.

8. A device according to claim 7, wherein the pivot axis is parallel to and spaced apart from a mounting plate of the securing arrangement.

9. A device according to claim 7, wherein the pivot axis is perpendicular to a mounting plate of the securing arrangement.

10. A device according to claim 4, wherein the openings are in the form of one or more elongate slots in a structure carried by a mounting plate of the securing arrangement, with a cam on a portion of the moveable member passing through the slot limiting possible pivoting movement.

11. A device according to claim 4, wherein the openings are in the form of one or more slots in the moveable member, with a cam portion of the securing arrangement passing through the slot(s) limiting possible pivoting movement.

12. A device according to claim 4, wherein the openings are in the form of two or more elongate slots or one or more curved slots that interact with two or more projections in such a way as to permit both relative rotational and sliding movement, defining a virtual pivot axis.

13. A device according to claim 4, wherein the openings are in the form of one or more cutouts in a structure or structures carried by the mounting plate, with a cooperating moveable member constrained to move so as to define a virtual pivot axis.

14. A device according to claim 2 or 3, wherein the securing arrangement and moveable member are held in loose association, with a degree of play therebetween being possible, moveable in constrained manner to define a virtual pivot axis.

15. A device according to claim 2 or 3, wherein the mounting plate includes a pivot pin that acts as a surface around which a moveable member pivots in constrained manner around a virtual pivot axis.

16. A device according to claim 2, 3 or 4, wherein the securing arrangement comprises a tubular member adapted to be fixed with respect to a platform.

17. A device according to any one of claims 2 to 16 and intended for use with a pivot axis thereof generally aligned with the fork direction, wherein the moveable member comprises an angled member having an upper portion in a generally vertically or horizontally oriented plane in the blocking position, with a lower portion in a plane inclined with respect to the upper portion.

18. A device according to any one of claims 2 to 16, intended for use with a pivot axis thereof generally transverse to the fork direction.

19. A device according to claim 1, 2 or 3, wherein the securing arrangement and moveable member are connected by a sliding linkage.

20. A device according to claim 19, wherein the securing arrangement comprises one or more guide openings, guide slots or guide tubes defining a vertically extending opening, for slideably receiving a moveable member.

21. A device according to claim 19, wherein the securing arrangement comprises a threaded guide tube for receiving a threaded rod.

22. A device according to claim 19, wherein the securing arrangement includes one or more guide pegs for cooperation with at least one elongate slot in a moveable member of plate-like configuration.

23. A device according to any one of the preceding claims, where the moveable member is of elongate form.

24. A device according to claim 23, wherein the moveable member is of generally planar configuration or includes a portion of generally planar configuration.

25. A device according to claim 23 or 24, wherein the moveable member is of bent configuration.

26. A device according to claim 24 or 25, wherein a planar portion of the moveable member is substantially aligned with the bottom surface of the platform when in the release position.

27. A device according to claim 24 or 25, wherein a planar position of the moveable member is parallel to and below the bottom surface of the platform when in the release position.

28. A device according claim 23, wherein the moveable member is of rod-like form, of straight or bent configuration.

29. A device according to any one of the preceding claims, the moveable member has one or more surfaces that, in use on a platform, are oriented generally vertically when the member is in the blocking position.

30. A device according to any one of the preceding claims, wherein the moveable member includes at least two surfaces that, in use on a platform, are oriented generally horizontally and vertically when the member is in the blocking position.

31. A device according to claim 30, wherein the moveable member is adapted, in use on a platform, to press against a racking beam or shelf to prevent movement of the platform in any horizontal direction when the member is in the blocking position.

32. A device according to any one of the preceding claims, when the moveable member includes a rounded portion or roller for ground-engagement.

33. A device according to any one of the preceding claims, wherein one or more rollers are provided on the securing arrangement and/or moveable member to aid movement.

34. A device according to any one of the preceding claims, including stop means to limit movement of the moveable member with respect to the securing arrangement.

35. A device according to any one of the preceding claims, wherein the moveable member in the blocking position acts as a two-way stop.

36. A device according to any one of claims 1 to 34, wherein the moveable member in the blocking position acts as a one-way stop.

37. A device according to any one of the preceding claims, including resilient means, for urging the moveable member to the blocking position.

38. A device according to any one of the preceding claims, wherein the moveable member is resilient and/or comprises at least one resilient element for reducing the shock created when the moveable member abuts a shelf.

39. A device according to any one of the preceding claims, wherein the securing arrangement comprises at least one resilient or flexible element for reducing shock of the moveable member abutting a shelf.

40. A device according to any one of the preceding claims, wherein the moveable member comprises an inclined portion that aids movement to the release position when in contact with a generally vertical surface.

41. A portable goods platform having openings for receiving lifting forks and being suitable for location on an elevated shelf of racking for storage with at least one

stop device attached thereto for preventing inadvertent dislodging of the platform when located on an elevated shelf of racking, the or each device comprising a securing arrangement fixed with respect to the platform, and a moveable member fixed with respect to the securing arrangement for movement, in use, between a release position in which it does not impede location of the platform on a horizontal surface and a blocking position in which a part of the moveable member abuts or is aligned with part of the racking when the platform is located on a shelf of the racking, to prevent relative horizontal movement of the platform with respect to the racking, the device being such that the moveable member is automatically moved to the release position when the platform is located on a horizontal surface and is automatically moved to the blocking position when the platform is located above a horizontal surface.

42. A portable goods platform having attached thereto one or more stop devices in accordance with any one of claims 1 to 40.

Intellectual Property Office

Application No:	GB1620884.5	**Examiner:**	Mr Joe Cornfield
Claims searched:	1-42	**Date of search:**	7 February 2017

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-5, 7, 9, 10, 12-20, 23, 24, 26-31, 33-36, 40	https://en.wikipedia.org/w/index.php?title=Latch_(hardware)&oldid=722898355 Wikipedia article entitled Latch (hardware) The door latch shown in the second figure and the crossbar/bolt shown in the sixth figure would appear suitable to attach to a pallet as per claim 1.
X	1-9, 11-14, 16-20, 22-36, 40, 42	JPH0966939 A MOTOHIRO A securing arrangement 21' is fixable to a platform and pivots relative to movable member 12 which could align with the platform or project down from it (fig 10)
X	1-7, 9-20, 22, 23, 27-36, 38-40, 42	KR20130054058 A HYUN A securing arrangement 11a is fixable to a platform and pivots relative to movable member 11b which could align with the platform or project down from it (fig 5)
X	1-10, 12-36, 40, 42	WO03/059786 A1 HUEFFERMANN A securing arrangement 17, 19 is fixable to a platform and pivots relative to movable member 16 which could align with the platform or project down from it (fig 5)
X	1-4, 6, 7, 14, 15, 17-19, 21, 29-31, 34-36, 40, 42	US1924824 A PRENTISS A securing arrangement 22 is fixable to a platform and pivots relative to movable member 16 which could align with the platform or project down from it (figs)
X	1-7, 9, 13-23, 25-40, 42	US5806863 A CTS A securing arrangement 15 is fixable to a platform and pivots relative to movable member 12 which could align with the platform or project down from it (fig 10)

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Intellectual Property Office

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC[X] :

Worldwide search of patent documents classified in the following areas of the IPC

B65D

The following online and other databases have been used in the preparation of this search report

WPI, EPODOC

International Classification:

Subclass	Subgroup	Valid From
B65D	0019/38	01/01/2006