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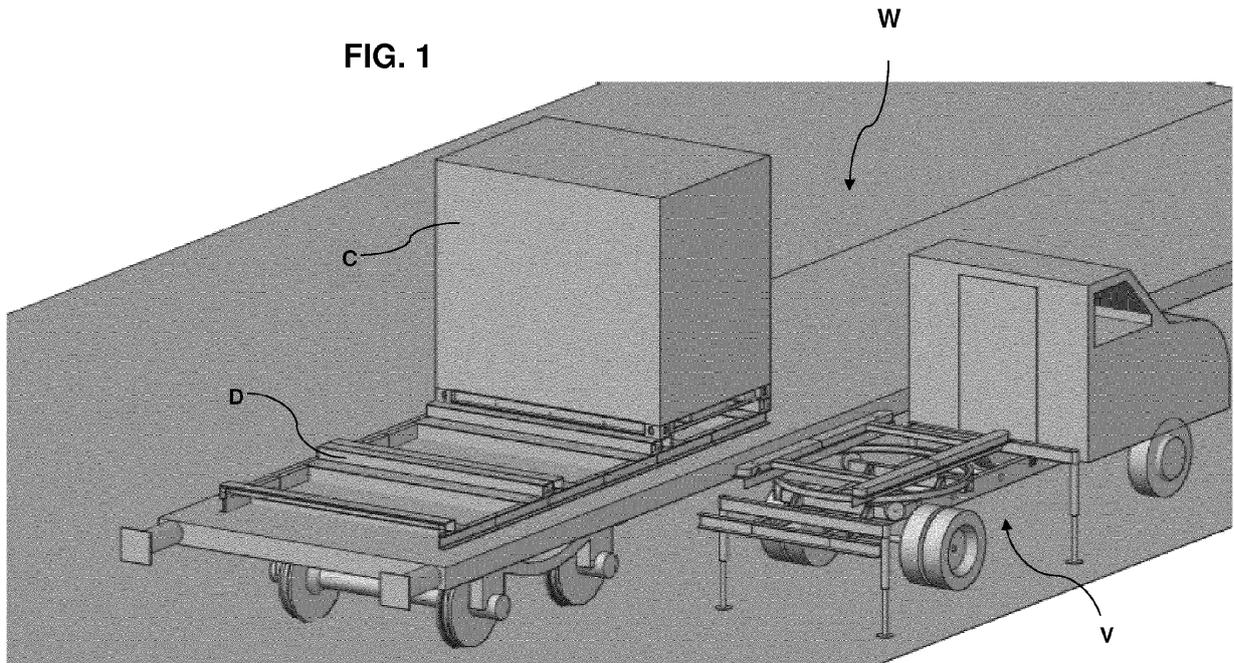
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(54) **A system for loading/unloading and vehicle**

(57) The system for loading/unloading crates or bases for goods transport is adapted to be mounted on a tyre-wheeled vehicle and comprises: a first fixed frame adapted to be mounted in a stable manner on the tyre-wheeled vehicle, a second mobile frame mounted on said first frame via rotation means adapted to allow the rota-

tion of said second frame with respect to said first frame, and a translation assembly mounted on said second frame via means adapted to allow the translation of said assembly with respect to said second frame; the translation assembly is adapted to support a crate or base for goods transport.

**FIG. 1**



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## Description

### Field of the invention

[0001] The present invention relates to a system for loading/unloading crates or bases for goods transport, and to a tyre-wheeled vehicle.

### State of the art

[0002] As known, goods may travel on tyre-wheeled vehicles, trains, ships and airplanes. There is a general tendency to limit road transport.

[0003] For this reason, in the case of "intermodal transport", there is a need, for example, to transfer the goods from trains to tyre-wheeled vehicles and from tyre-wheeled vehicles to trains.

[0004] Currently, such a problem is solved by means of so-called "mobile crates", i.e. large containers which may be easily transported on the frame of the tyre-wheeled vehicles and on the loading platform of railway goods wagons or easily rested on the ground in a storage area.

[0005] Nevertheless, the current "mobile crates" are considerable large and therefore may be loaded only on considerable large tyre-wheeled vehicles.

[0006] Such large crates contain large quantities of goods and therefore may imply one or more sorting step of their contents and they are not always suitable for delivery to the final consignee.

[0007] Such large vehicles may find it difficult to pass on narrow roads.

[0008] Therefore, better solutions than the current existing ones are required to promote rail transport.

### Summary of the invention

[0009] The idea at the basis of the present invention is the one of using a small transport element, i.e. having a base of much smaller dimensions than those of "movable crates" or of "ISO containers". Such an element may be a crate (that is an element similar to a box) or a supporting base (that is an element similar to a tray).

[0010] More precisely, the idea is to select a first dimension of the base of the element corresponding to half the length of a "movable crate" (which is typically approximately 250 cm) and a second dimension of the base of the element corresponding to approximately a submultiple (for example one third) of the length of an "ISO container"; as will be explained in the detailed description, the second dimension is preferably a little smaller with respect to a submultiple of the length of an "ISO container".

[0011] According to a specific embodiment, the dimensions of the base of the transport element are 250 cm and 185 cm, respectively.

[0012] To facilitate transporting such a smaller transport element, the idea is to position it on a tyre-wheeled

vehicle so that the volume in transversal direction is smaller than the volume in longitudinal direction.

[0013] To obtain this result, the idea is to equip the tyre-wheeled vehicle with a loading/unloading system which is capable, during the loading step, of taking the element for example from the goods wagon of the train and of rotating it (typically by 90°), and, in the unloading step, of rotating the element and putting it on the goods wagon of the train.

[0014] According to the preferred embodiment above, due to the rotation, the width of the tyre-wheeled vehicle may also be only 185 cm (or slightly more) - without the rotation, the width of the tyre-wheeled vehicle should have been 250 cm (or slightly more), therefore much greater.

[0015] The present invention is defined by the claims herein appended.

[0016] According to a first main aspect, the present invention relates to a system for loading/unloading crates or bases for goods transport.

[0017] According to a second main aspect, the present invention relates to a tyre-wheeled vehicle which comprises such a loading/unloading system.

[0018] In general, the system for loading/unloading crates or bases for goods transport is adapted to be mounted on a tyre-wheeled vehicle, and comprises:

- a first fixed frame adapted to be mounted in a stable manner on the tyre-wheeled vehicle (it could also be integrated in the frame of the vehicle),
- a second mobile frame mounted on said first frame via rotation means adapted to allow the rotation of said second frame with respect to said first frame, and
- a translation assembly mounted on said second frame via means adapted to allow the translation of said assembly with respect to said second frame;

in which said translation assembly is adapted to support a crate or base for goods transport.

[0019] Said translation assembly may advantageously comprise:

- a third mobile frame mounted on said second frame via first translation means adapted to allow the translation of said third frame with respect to said second frame, and
- a fourth mobile frame arranged on said third frame and provided with second translation means adapted to allow the translation of said fourth frame with respect to said third frame;

in which said fourth frame is adapted to support a crate or base for goods transport.

[0020] The travel of said third frame may be between 10 and 100 cm, preferably between 40 cm and 60 cm.

[0021] The travel of said fourth frame may be between 240 and 260 cm, preferably it is approximately 250 cm.

**[0022]** Said fourth frame is preferably a trolley provided with at least three sliding blocks, more preferably with at least four sliding blocks; these sliding blocks typically have rollers; all or part of these rollers may be constrained to each other by tracks.

**[0023]** Said trolley is typically adapted to translate at least partly outside said third frame. Said fourth frame is typically adapted to rise vertically to raise/lower a crate or base for goods transport.

**[0024]** The vertical travel of said fourth frame may be between 5 and 20 cm, preferably between 10 cm and 15 cm.

**[0025]** Said third frame may be adapted to hook to a loading platform, in particular a loading platform of a vehicle or a loading platform positioned on a vehicle.

**[0026]** The system according to the present invention advantageously comprises locking means adapted to lock a crate or base when loaded on the tyre-wheeled vehicle. Said locking means may be associated with said second frame and/or said third frame and/or said fourth frame.

**[0027]** Said rotation means may allow rotations at least up to approximately 90°, preferably rotations at least up to approximately 90° in two different rotation directions, more preferably rotations of any angle in any rotation direction.

**[0028]** The system according to the present invention may comprise pneumatic actuators adapted to cause the movements of its parts, in particular all the movements of its parts.

**[0029]** The system according to the present invention may comprise a remote control adapted to remote-control the movements of its parts, in particular all the movements of its parts.

**[0030]** Generally, the tyre-wheeled vehicle comprises a loading/unloading system as defined above; typically a small lorry is involved.

**[0031]** The tyre-wheeled vehicle according to the present invention may comprise at least three (preferably four) supporting feet, preferably with pneumatic actuated movement; the term "tyre-wheeled vehicle" means a vehicle provided with wheels (typically at least four) for moving on roads.

**[0032]** The tyre-wheeled vehicle according to the present invention may comprise at least three (preferably four) supporting feet (in particular with pneumatic actuated movement) adapted to provide vertical alignment between said loading/unloading system and a supporting system of crates or bases for goods transport. According to a first further aspect, the present invention relates to a small crate for goods transport on tyre-wheeled vehicle, train, ship, airplane.

**[0033]** Said crate typically has at least two (preferably four) seats at the lower face, for receiving at least two (preferably four) corresponding locking pins (preferably retractable).

**[0034]** Alternatively, said crate may have at least two (preferably four) locking pins (preferably retractable) at

the lower face.

**[0035]** Said crate may have at least four feet at the lower face, having lower end adapted to come in contact with the upper face of a loading platform.

5 **[0036]** According to a second further aspect, the present invention relates to a small supporting base for goods transport on tyre-wheeled vehicle, train, ship, airplane. Said base typically has at least two (preferably four) seats at the lower face, for receiving at least two (preferably four) corresponding locking pins (preferably retractable).

**[0037]** Alternatively, said base may have at least two (preferably four) locking pins (preferably retractable) at the lower face.

10 **[0038]** Said base may have at least four feet at the lower face, having lower end adapted to come in contact with the upper face of a loading platform.

**[0039]** According to a third further aspect, the present invention relates to a loading platform for railway wagon adapted to support two or more crates or bases for goods transport.

**[0040]** The loading platform according to the present invention typically comprises at least two (preferably four) pins adapted to cooperate with at least two (preferably four) corresponding seats on the lower face of a crate or base for goods transport.

**[0041]** Said pins are preferably retractable.

20 **[0042]** The loading platform according to the present invention may comprise a manual-type lever mechanism adapted to extract/retract at least one of said pins, preferably at least two of said pins.

**[0043]** Said lever mechanism advantageously comprises a device for manually locking said lever.

25 **[0044]** The loading platform according to the present invention typically comprises at least four feet having upper end adapted to come in contact with the lower face of the crate or base.

**[0045]** Instead of the pins, said loading platform may comprise at least two (preferably four) seats adapted to cooperate with at least two (preferably four) corresponding pins on the lower face of a crate or base for goods transport.

30 **[0046]** The loading platform according to the present invention may comprise at least two (preferably four) columns for resting similar loading platform thereon.

**[0047]** According to a fourth further aspect, the present invention relates to a railway wagon comprising a supporting loading platform as defined above.

#### 50 **Brief description of the figures**

**[0048]** The present invention will be more apparent from the detailed description below, to be considered together with the accompanying drawings herein, in which

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Fig. 1 diagrammatically shows a three-dimensional view of an embodiment of the loading/unloading system according to the present invention mounted on

a tyre-wheeled vehicle in a first operating position (without crate and with system retracted and parallel to the vehicle),

Fig. 2 diagrammatically shows the system in fig. 1 with a crate positioned on the system,

Fig. 3 diagrammatically shows a three-dimensional view of an embodiment of the loading/unloading system according to the present invention mounted on a tyre-wheeled vehicle in a second operating position (without crate and with system retracted and perpendicular to the vehicle),

Fig. 4 diagrammatically shows the system in fig. 3 with a crate positioned on the system,

Fig. 5 diagrammatically shows an embodiment of the loading/unloading system according to the present invention exploded in its four fundamental components (that is four frames),

Fig. 6 diagrammatically shows, in greater detail, the trolley in fig. 5 under two different operating conditions (on the right with internal rollers and on the left with external rollers),

Fig. 7 diagrammatically shows a sequence of views corresponding to an operation of unloading a crate from a railway wagon,

Fig. 8 diagrammatically shows an embodiment of the base according to the present invention,

Fig. 9 diagrammatically shows an embodiment of the loading platform according to the present invention,

Fig. 10 diagrammatically shows a first detail of the loading platform in fig. 9 according to two slightly different views (one with a protection casing and one without the casing), and

Fig. 11 diagrammatically shows a second detail of the loading platform in fig. 9.

Both this description and these drawings are only to be considered for illustrative purposes and therefore are non-limiting.

### Detailed description of the invention

**[0049]** As is easy to understand, there are many methods for implementing the present invention into practice. Below is a detailed description of a single embodiment highlighting, here and there, some of the many possible variants; obviously, the specific description of the embodiment is non-limiting of the present invention which, instead, is defined by the claims herein appended.

**[0050]** The system in figures 1 to 6 serves to load and unload typically small crates for goods transport and/or small bases for goods transport; the crate encloses the goods to be transported like a box while the base supports the goods to be transported like a tray; the small sizes mainly refer to the width and to the length of the lower face of the crate and of the base.

**[0051]** In figures 1 to 4, the loading/unloading system is mounted on a small tyre-wheeled vehicle V; in fig. 5, the main components are shown of the system, which is indicated as a whole with the letter A.

**[0052]** In fig. 1, the loading/unloading system according to the present invention is mounted on a tyre-wheeled vehicle V in a first operating position without crate and with system retracted and parallel to the vehicle; vehicle V is beside a wagon W; on the loading platform of wagon W there is positioned a loading platform D according to the present invention; on the loading platform D there is positioned a crate C according to the present invention.

**[0053]** In fig. 2, crate C is no longer on wagon W (as in fig. 1), but is on vehicle V.

**[0054]** In fig. 3, the loading/unloading system is rotated by 90° with respect to the situation in fig. 1 and therefore the system is perpendicular both to the length of vehicle V and to the length of wagon W; crate C is positioned on wagon W.

**[0055]** In fig. 4, crate C is no longer on wagon W (as in fig. 3), but is on vehicle V.

**[0056]** With particular reference to fig. 5 and fig. 6, system A comprises:

- a first frame T1,
- a second frame T2,
- a third frame T3, and
- a fourth frame T4;

the set of the third frame T3 and of the fourth frame T4 form substantially a translation assembly.

**[0057]** The first frame T1 is fixed and is adapted to be mounted in a stable manner on the tyre-wheeled vehicle; it may also be wholly or partly integrated in the frame of said vehicle; in the present embodiment in the figures, the first frame T1 consists of substantially two metal bars.

**[0058]** The second frame T2 is mobile and is mounted on the first frame T1 via rotation means (in the present embodiment in the figures, these are four rollers mounted in particular at each end of the two bars of the first frame T1) adapted to allow the rotation of the second frame T2 with respect to the first frame T1; in the present embodiment in the figures, the second frame T2 consists of a large metal ring resting on the four rollers and of two metal bars with "C"-shaped section, secured on the ring; the two "Cs" of the two bars face each other.

**[0059]** The third frame T3 is mobile and is mounted on the second frame T2 via first translation means (in the present embodiment in the figures, these are a series of rollers) adapted to allow the translation of the third frame T3 with respect to the second frame T2; in the present embodiment in the figures, the third frame T3 consists of two metal bars with "Z"-shaped section, secured on the ring; on one of the end stretches of the "Z" of each bar there are hinged two sets of rollers in two different positions, respectively; such rollers are located (when the system is assembled) inside the "C"-shaped bars and allow the translation of the third frame T3 with respect to the second frame T2; therefore it is a telescopic type of translation solution; the middle stretch of the "Z" of each bar is substantially horizontal (when the system is assembled).

**[0060]** The fourth frame T4 is mobile, is arranged on the third frame T3 and is provided with translation means (in the present embodiment in the figures, these are four rollers sliding blocks) adapted to allow the translation of the fourth frame T4 with respect to the third frame T3; in the present embodiment in the figures, the fourth frame T4 consists of two metal longitudinal bars connected by two metal transversal bars. The two longitudinal bars serve to support a crate C or base B (when present). Each of the two longitudinal bars accommodates two rollers sliding blocks P almost integrally; a first sliding block is in a first lower end zone of a longitudinal bar and a second sliding block is in a second lower end zone of the same longitudinal bar; in a first operating condition of the fourth frame T4 (on the right in fig. 6), the rollers are almost integrally inside the outer profile of the longitudinal bars and, in a second operating condition of the fourth frame T4 (on the left in fig. 6), the rollers are totally outside the outer profile of the longitudinal bars and therefore are rather far from the bars. It is therefore understood that, according to the present embodiment in the figures, the fourth frame T4 is a trolley provided with sliding blocks (in particular with rollers) adapted to translate on the third frame T3; the sliding blocks are advantageously provided with rollers (in particular two rollers); all or part of these rollers could also be constrained to each other by tracks.

**[0061]** The assembly of the third frame T3 and of the fourth frame T4 form substantially a translation assembly which is adapted to support a crate C or base B (when present).

**[0062]** As will be more apparent below, the fourth frame T4 is adapted to translate at least partly outside the third frame T3; that is, in the present embodiment in the figures, the trolley rollers are adapted to roll not only on the third frame T3 (in particular, the middle stretch of the "Z" of the bars) but at least partly outside.

**[0063]** The travel of the third frame T3 may be between for example 10 and 100 cm, preferably between 40 cm and 60 cm, that is it is rather short; thereby, the overhang is limited; such a translation serves only to bring the third frame T3 close to a loading platform.

**[0064]** The travel of the fourth frame T4 is between for example 240 cm and 260 cm, preferably is approximately 250 cm, that is rather long since the fourth frame T4 serves the purpose of picking and placing the crate or base; the dimensioning of the length of the fourth frame T4 may be obtained, for example, by adding half the length of the third frame T3 and half the width of the loading platform where the crate or base rests.

**[0065]** As is apparent, for example from fig. 6 and also from fig. 7-3 and fig. 7-4, the fourth frame T4 is adapted to rise vertically to raise/lower a crate or base for goods transport.

**[0066]** The vertical travel of the fourth frame T4 may be between, for example, 5 cm and 20 cm, preferably between 10 cm and 15 cm; such a vertical travel is relatively short because it must be sufficient to raise the crate or base to prevent interferences during the translation

for example from the wagon to the vehicle or vice versa.

**[0067]** In the embodiment in the figures, the third frame T3 is adapted to hook to a loading platform, in particular a loading platform of a vehicle or a loading platform positioned on a vehicle; the hooking occurs for example, in the situation shown in fig. 7-3, that is when by translating, the third frame T3 is brought close to the loading platform; thereby, the fourth frame T4 may translate safely by moving from the third frame T3 to the loading platform and vice versa.

**[0068]** Advantageously, the system according to the present invention may comprise locking means adapted to lock a crate or base when loaded on the tyre-wheeled vehicle (these are not shown in fig. 5); such locking means may be associated with the second frame T2 and/or the third frame T3 and/or the fourth frame T4.

**[0069]** The rotation means of the system according to the embodiment in the figures allow rotations of the second frame T2 by any angle in any rotation direction (see fig. 5); according to alternative and less advantageous embodiments, such rotations could be rotations at least up to approximately 90° in two different rotation directions or rotations at least up to approximately 90° in a single rotation direction. The system according to the present invention may comprise actuators (not shown in the figures) adapted to cause the movements of its parts, preferably all the movements of its parts; typically all the actuators will be hydraulic because it is convenient in a lorry, but it is also possible for part or all of them to be for example pneumatic or electric. When pneumatic actuators are used for the horizontal and vertical movements of the fourth frame T4 (including the ones of its rollers sliding blocks), since this frame has a very long travel, it is advantageous to provide a pneumatic circuit which is inside the frame and which is connected to a fixed pneumatic system via flexible pipes; it should be mentioned that the pneumatic motors of the rollers are typically braked (and therefore locked) when they are not rotating.

**[0070]** The system according to the present invention may comprise remote control (not shown in the figures) adapted to remote-control the movements of its parts, preferably all the movements of its parts.

**[0071]** Figures 1 to 4 show a small tyre-wheeled vehicle.

**[0072]** In these figures, the vehicle is provided with four supporting feet; these supporting feet are in themselves known in the field and typically have pneumatic actuated movement; such feet are generally called "stabilizers" because they serve to ensure good stability of the vehicle when the same is to perform operations other than road movement.

**[0073]** As is apparent from the above, according to the present invention, the loading/unloading system is to be aligned vertically and conveniently to a supporting system so that the transfer of the crates and/or bases may take place with uniform movements and therefore without the risk of the crates, bases and goods from falling.

**[0074]** Therefore, the idea is to provide such a vertical alignment using the supporting feet; however, there is a need to use supporting feet (preferably pneumatic) with the possibility of being extended (and therefore adjusting the vertical position of the vehicle and of the loading/unloading system) by at least 30-40 cm (or even more); usually, the supporting feet serve to raise the vehicle slightly, 5-10 cm.

**[0075]** In figures 1 to 4, the supporting feet are under rather extended conditions (obviously the tyres of the vehicle do not touch the ground in the slightest manner). An operation for unloading a crate from a railway wagon (which in the case of the present invention, is a "goods wagon") will be described below with the aid of figures 7.

**[0076]** The vehicle provided with a loading/unloading system according to the present invention approaches a goods wagon on the side, on which a loading platform is positioned according to the present invention; the vehicle is arranged, for example and preferably, so that the longitudinal axis thereof is substantially parallel to the longitudinal axis of the wagon; the vehicle is sufficiently close to the wagon.

**[0077]** It is worth mentioning that a vehicle provided with a loading/unloading system according to the present invention may also be arranged transversally with respect to the wagon, for example approaching the same in reverse motion; however, in this case, all the functionalities of the loading/unloading system are not taken advantage of, in particular the rotation functionalities are not taken advantage of. Locked on the loading platform according to the present invention is a crate according to the present invention; in particular, four retractable pins of the loading platform are extracted and inserted into four corresponding seats on the lower face of the crate (the seats are at the four lower corners of the crate).

**[0078]** An operator takes a special remote control and controls the movements (of the supporting feet of the vehicle and of the loading/unloading system of the vehicle) described below.

**[0079]** The four supporting feet of the vehicle are extended until they rest on the ground and then they conveniently raise the vehicle; the operator attempts to ensure that the third frame of the system of the vehicle is horizontally aligned with the loading platform positioned on the wagon.

**[0080]** The loading/unloading system of the vehicle is rotated by approximately 90°; precisely, such a rotation involves the second frame and the third frame and the fourth frame.

See fig. 7-1.

**[0081]** The loading/unloading system is brought close to the wagon; such an approach involves the third frame and the fourth frame; precisely, the third frame translates in direction of the wagon until it reaches the loading platform positioned on the wagon; since the fourth frame is arranged on the third frame, the translation of the third

frame causes a corresponding translation of the fourth frame.

See fig. 7-2.

**[0082]** If the rotation of the loading/unloading system (in particular of the third frame) and the height of the vehicle (in particular of the loading/unloading system, more specifically of the third frame) are precise, the front side of the third frame is perfectly resting on a lateral side of the loading platform positioned on the wagon; in this situation, these two elements are hooked to each other (such hooking means are advantageous although they are not strictly necessary). Contrarily, the operator may act on the remote control thus lowering or raising the vehicle a little and/or rotating the system a little on the one side or the other until rotation and height are sufficiently precise; after these adjustment operations, there may be a need to further bring the third frame slightly closer to the loading platform.

**[0083]** Then, the fourth frame is translated in direction of the wagon; the rollers of its sliding blocks roll first on the third frame and then on the loading platform positioned on the wagon; initially, all four sliding blocks are on the third frame, then two sliding blocks are on the third frame and two sliding blocks are on the loading platform, finally all four sliding blocks are on the loading platform.

See fig. 7-3.

**[0084]** The fourth frame is translated until it is exactly below the crate to be unloaded.

**[0085]** The fourth frame stops and rises vertically (due to suitable means) while keeping the rollers resting on the loading platform; first the fourth frame rises (for example by 6 or 7 cm) until coming in contact with the lower face of the crate, then the fourth frame rises (for example by other 6 or 7 cm) thus also raising the crate.

**[0086]** At this point, the fourth frame is translated backwards in direction of the vehicle while also transporting the crate; initially, all four sliding blocks are on the loading platform, then two sliding blocks are on the third frame and two sliding blocks are on the loading platform, finally all four sliding blocks are on the third frame; it is worth mentioning that the weight of the crate is supported quite well by the vehicle and by the wagon.

See fig. 7-4.

**[0087]** The fourth frame (with the crate) is translated backwards until it is exactly on the third frame; it stops here and its rollers are kept braked.

See fig. 7-5.

**[0088]** The third frame (with the fourth frame and with the crate) is translated backwards (after possibly being unhooked from the loading platform) until it is centred on

the second frame.

See fig. 7-6.

**[0089]** The fourth frame lowers vertically while keeping the braked rollers resting on the third frame; first the fourth frame lowers (for example by 6 or 7 cm) and thereby lowers the crate which is locked due to, for example, suitable pins of the second frame, then the fourth frame lowers (for example by other 6 or 7 cm) completely. The second frame (with the third frame and with the fourth frame and with the crate) is rotated backwards by approximately 90°.

See fig. 7-7.

**[0090]** The four supporting feet of the vehicle are completely shortened; that is, first they lower the vehicle until its tyres touch the ground and then they return to the resting position.

**[0091]** At this point, the vehicle may move towards its destination while transporting the unloaded crate.

**[0092]** It is apparent that when a crate is on the vehicle and is to be loaded on the wagon, the operations take place in reverse order with respect to that described above.

**[0093]** Fig. 8 shows an embodiment of a small supporting base B for goods transport on tyre-wheeled vehicle, train, ship, airplane.

**[0094]** The dimensions of the base in fig. 8 are 250 cm x 185 cm; obviously, such values are not to be considered restrictively.

**[0095]** The base typically has at least four seats (not shown in fig. 8) at the lower face (not shown in fig. 8), for receiving four corresponding locking pins (preferably retractable); in this embodiment, the seats are at the edges of the base. Alternatively, the base may have four locking pins (preferably retractable) at the lower face.

**[0096]** The base may have four feet at the lower face, having lower end adapted to come in contact with the upper face of a loading platform; this is not the case in the embodiment in fig. 8.

**[0097]** In fig. 8, the seats are apparent which are adapted to accommodate the longitudinal bars of a trolley of a loading system according to the present invention.

**[0098]** A structure similar to the one just described may be comprised in a crate C according to the present invention; an embodiment of such a crate is shown in figures 1 to 7.

**[0099]** Fig. 9 shows an embodiment of a loading platform D for railway wagon adapted to support two or more crates or bases for goods transport; such a loading platform is adapted to be positioned, for example, on the loading platform of a railway wagon or on the loading platform of a large tyre-wheeled vehicle.

**[0100]** The dimensions of the loading platform in fig. 9 are 606 cm x 250 cm; obviously, such values are not to be considered restrictively. On such a loading platform

there may be positioned, one beside the other, for example, three bases like the one in fig. 8 (even if only one is provided laterally in fig. 9, for clarity); in the direction of the length,  $606 - 3 \times 185 = 50$  cm will remain free which are used (in this embodiment) for the columns of the loading platform which will be explained below.

**[0101]** The loading platform according to the present invention typically comprises four pins (see in particular fig. 10) adapted to cooperate with four corresponding seats on the lower face of a crate or base for goods transport.

**[0102]** Said pins are preferably retractable pins (see in particular fig. 10).

**[0103]** The loading platform according to the present invention may comprise a manual-type lever mechanism adapted to extract/retract at least one of said pins (see in particular fig. 10), preferably at least two of said pins.

**[0104]** Said lever mechanism advantageously comprises a device for manually locking said lever (see in particular fig. 10); in the embodiment in fig. 10, the pin retracts by pushing a knob and is extracted by pulling a knob and there is a small plate which may rotate and which, in the position shown in fig. 10, avoids the user from having to translate the knob.

**[0105]** The loading platform according to the present invention typically comprises at least four feet (see in particular fig. 10-1) having upper end adapted to come in contact with the lower face of the crate or base.

**[0106]** Instead of the pins, said loading platform may comprise seats adapted to cooperate with four corresponding pins on the lower face of a crate or base for goods transport.

**[0107]** Generally, the loading platform according to the present invention comprises means adapted to lock the crates or bases which are positioned thereon; such locking means may be manual or automatic; the manual locking means may also be very similar to the ones commonly used for the "mobile crates" and the "ISO containers".

**[0108]** The loading platform according to the present invention may comprise at least two (preferably four) columns (see fig. 9) for resting similar loading platform thereon.

**[0109]** Fig. 11 shows a detail of the loading platform in fig. 9; it corresponds to a return which, by pulling a single knob, simultaneously allows both a pin on the right and a pin on the left of the loading platform to be extracted.

**[0110]** It is worth mentioning that the loading/unloading system and the tyre-wheeled vehicle according to the present invention and as claimed herein may also be used with crates, with bases and with loading platforms for transport of goods other than those defined and described above.

## 55 Claims

1. System for loading/unloading crates or bases for goods transport, adapted to be mounted on a tyre-

wheeled vehicle, comprising:

- a first fixed frame adapted to be mounted in a stable manner on the tyre-wheeled vehicle,
- a second mobile frame mounted on said first frame via rotation means adapted to allow the rotation of said second frame with respect to said first frame, and
- a translation assembly mounted on said second frame via means adapted to allow the translation of said assembly with respect to said second frame;

in which said translation assembly is adapted to support a crate or base for goods transport.

2. System as claimed in claim 1, wherein said translation assembly comprises:

- a third mobile frame mounted on said second frame via first translation means adapted to allow the translation of said third frame with respect to said second frame, and
- a fourth mobile frame arranged on said third frame and provided with second translation means adapted to allow the translation of said fourth frame with respect to said third frame;

in which said fourth frame is adapted to support a crate or base for goods transport.

3. System as claimed in claim 2, wherein said fourth frame is a trolley provided with at least three rollers sliding blocks, preferably at least four rollers sliding blocks.

4. System as claimed in claim 2 or 3, wherein said fourth frame is adapted to rise vertically to raise/lower a crate or base for goods transport.

5. System as claimed in claim 2 or 3 or 4, wherein said third frame is adapted to hook to a loading platform, in particular a loading platform of a vehicle or a loading platform positioned on a vehicle.

6. System as claimed in any one of the preceding claims, comprising locking means adapted to lock a crate or base when loaded on the tyre-wheeled vehicle.

7. System as claimed in any one of the preceding claims, wherein said rotation means allow rotations of at least approximately 90°, preferably approximately 180°.

8. System as claimed in any one of the preceding claims, comprising pneumatic actuators adapted to cause the movements of its parts.

9. System as claimed in any one of the preceding claims, comprising a remote control adapted to remote-control the movements of its parts.

5 10. Tyre-wheeled vehicle comprising a loading/unloading system according to any one of the preceding claims from 1 to 9.

10 11. Tyre-wheeled vehicle as claimed in claim 10, comprising at least three (preferably four) supporting feet adapted to provide vertical alignment between said loading/unloading system and a supporting system of crates or bases for goods transport.

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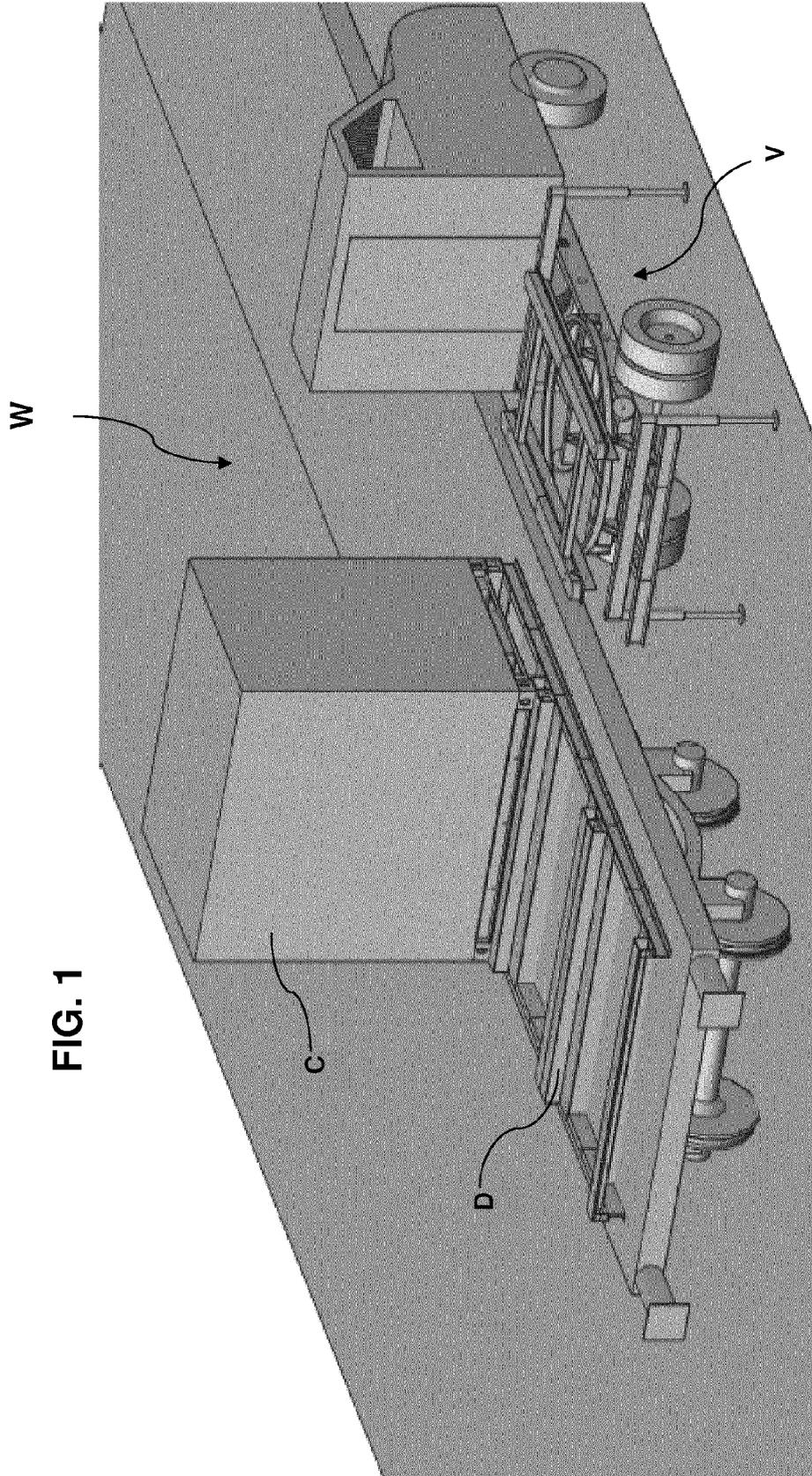
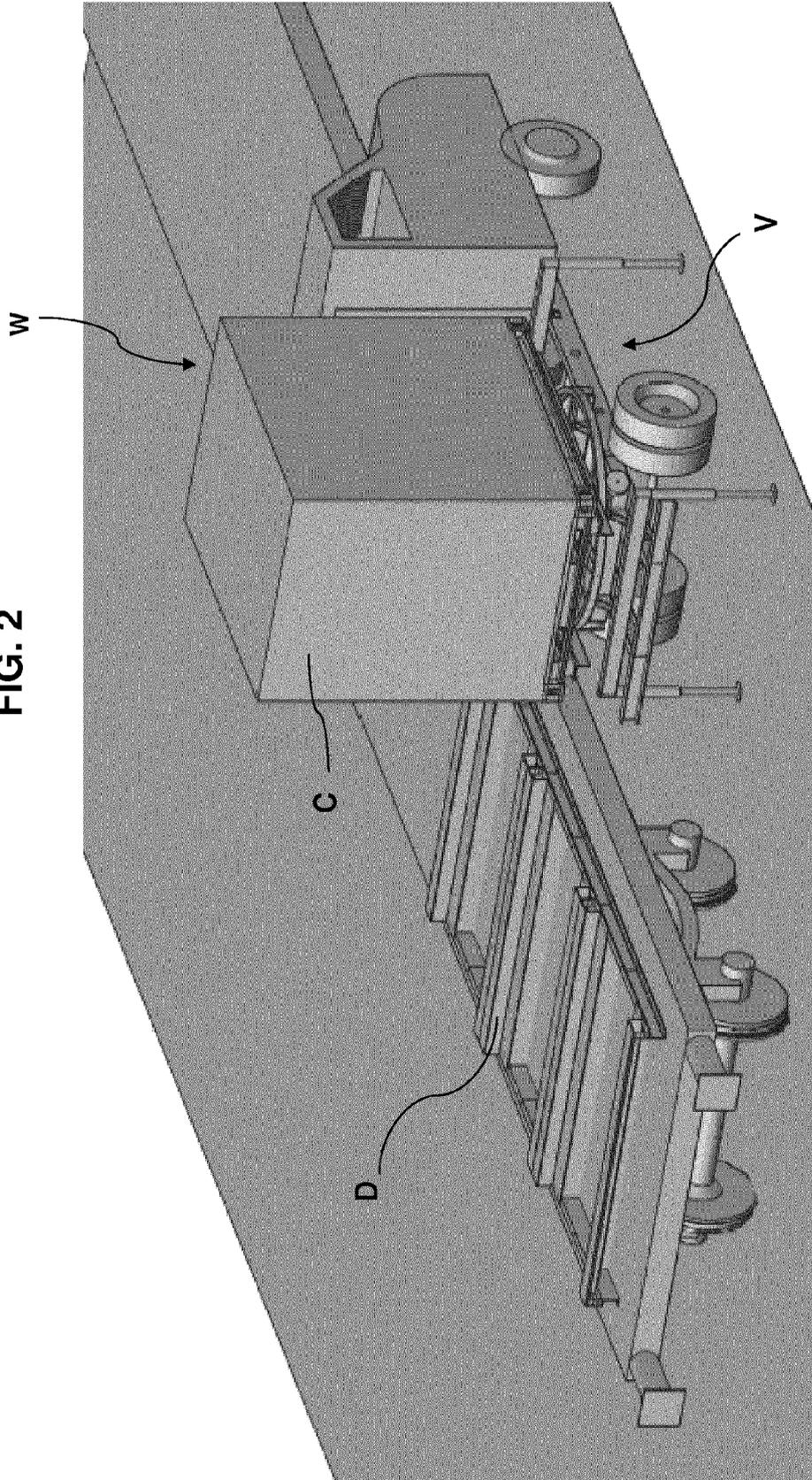


FIG. 2



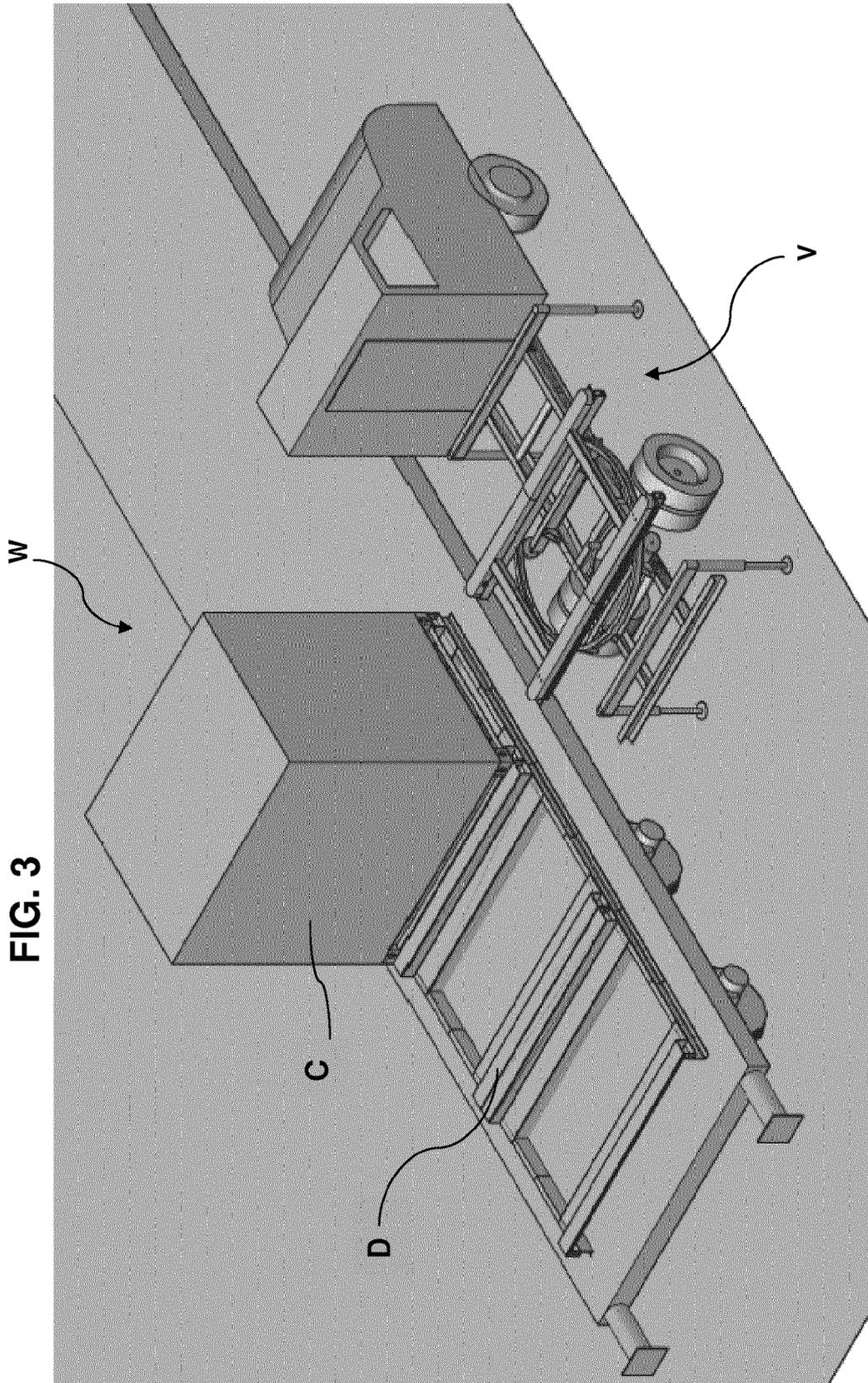
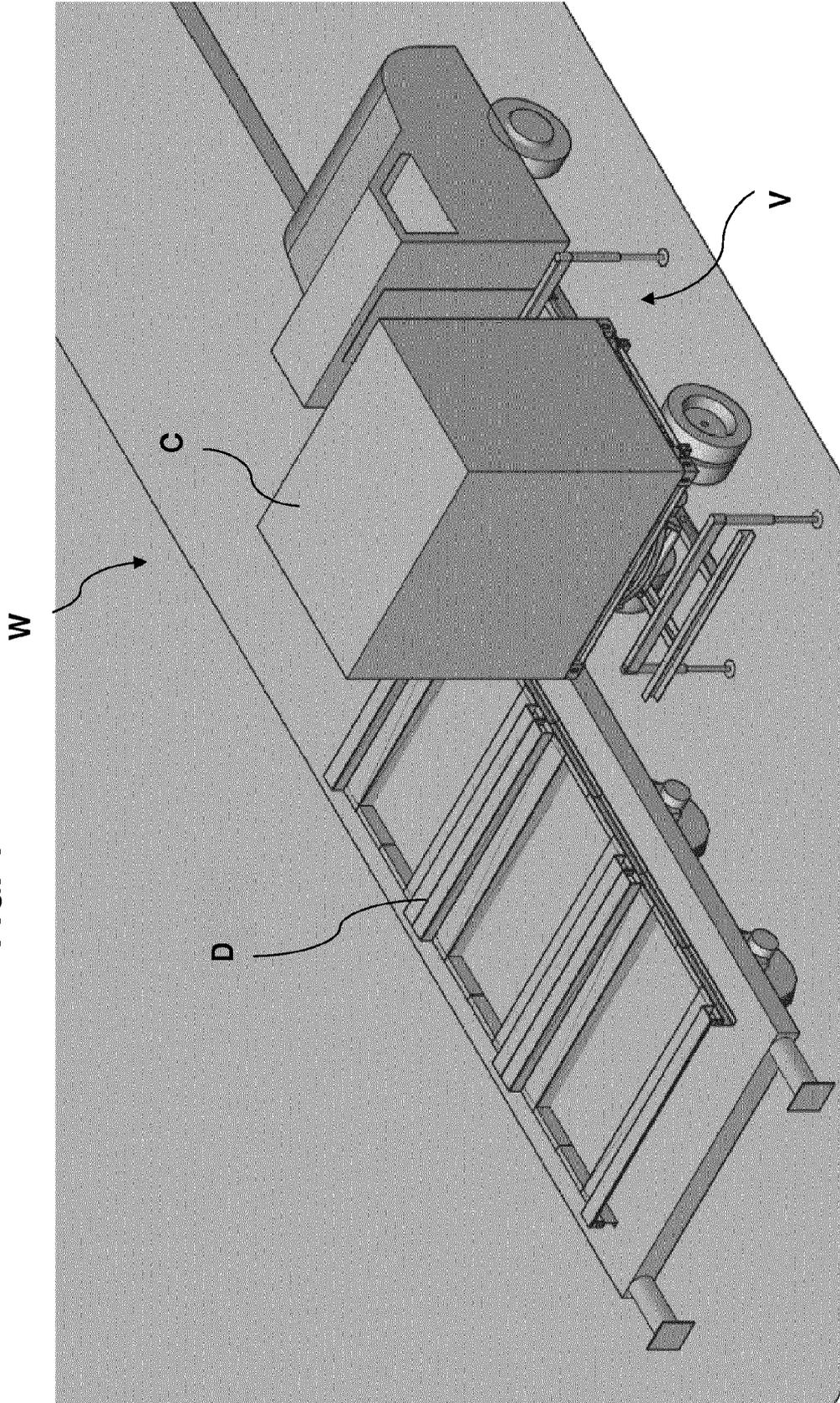
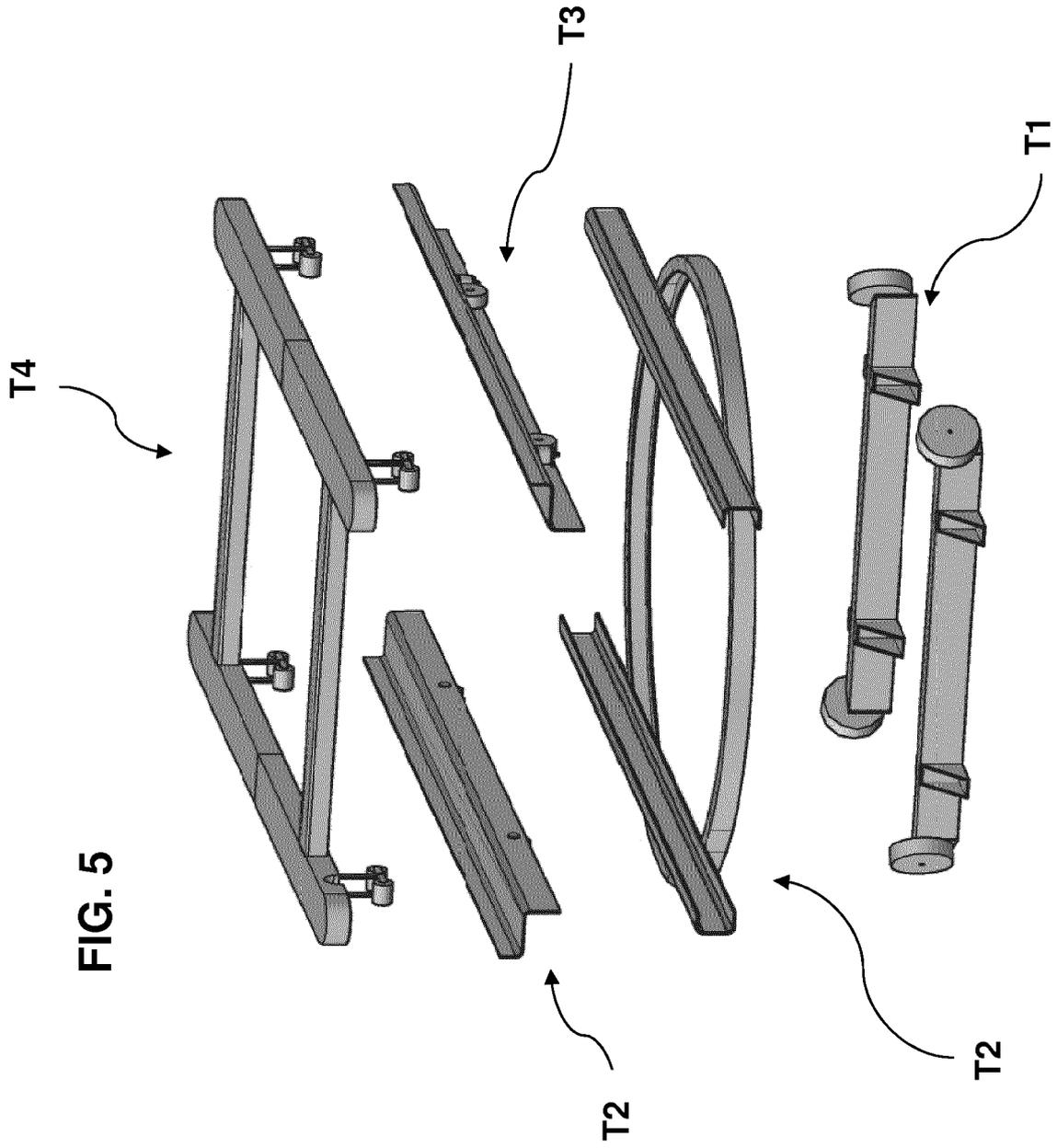


FIG. 4





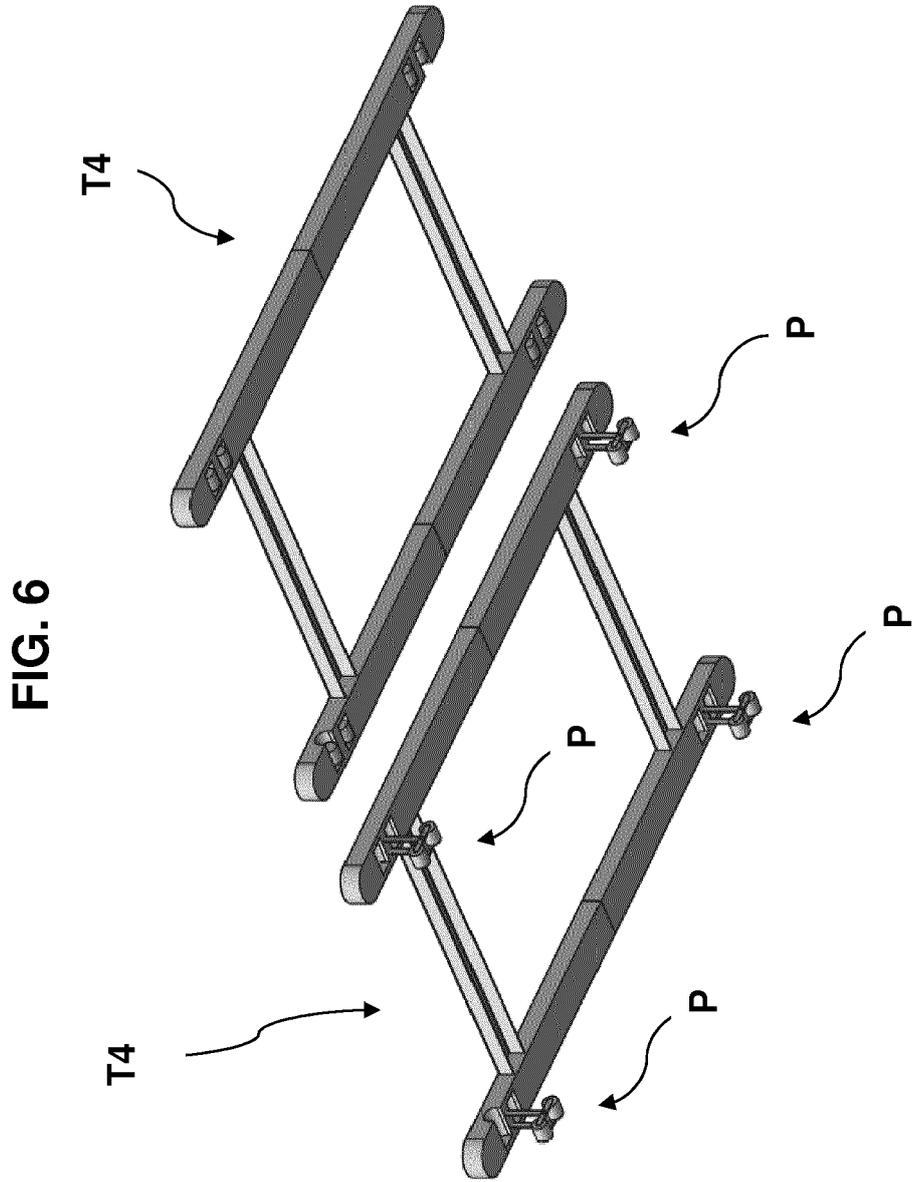


FIG. 7-1

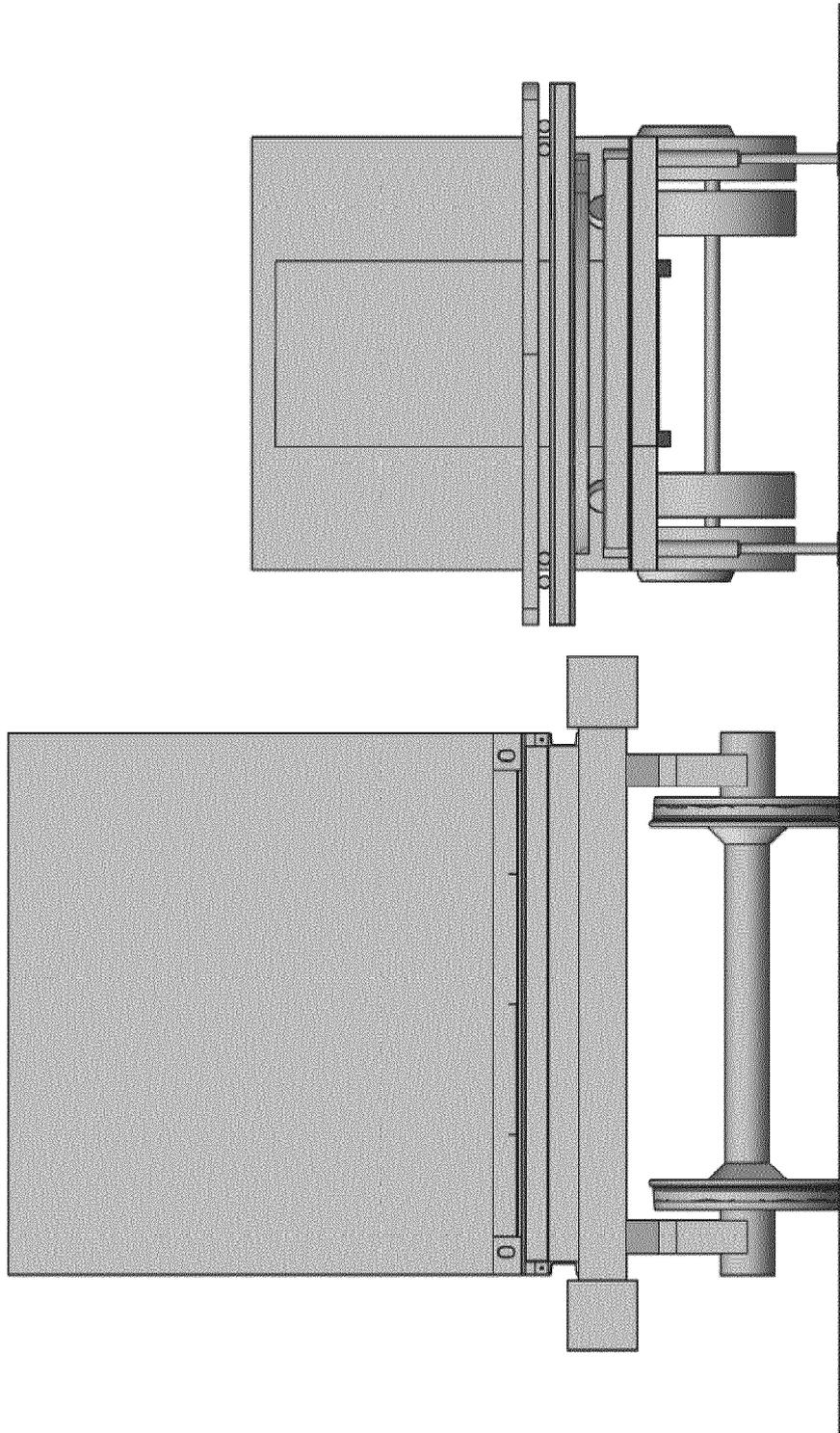


FIG. 7-2

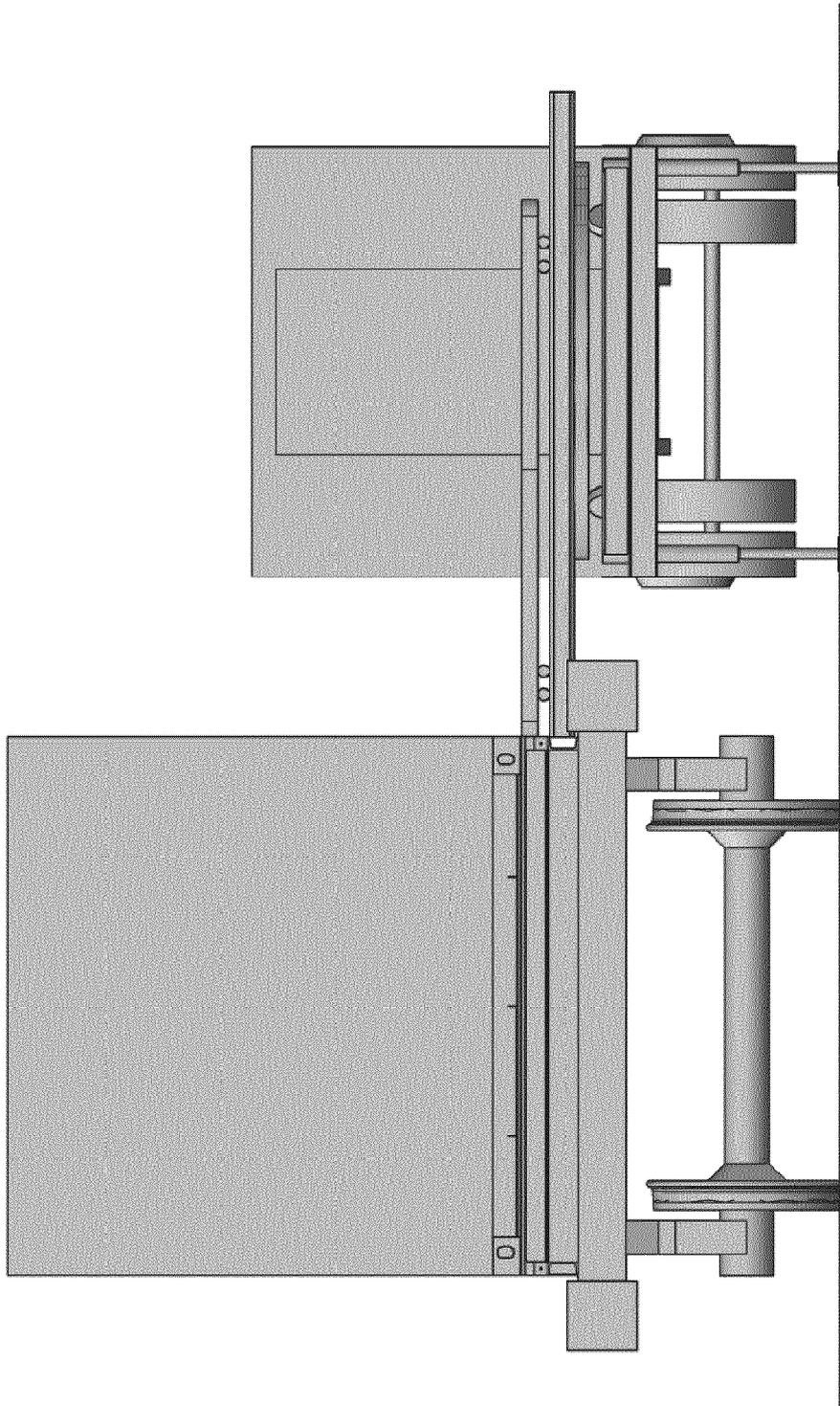


FIG. 7-3

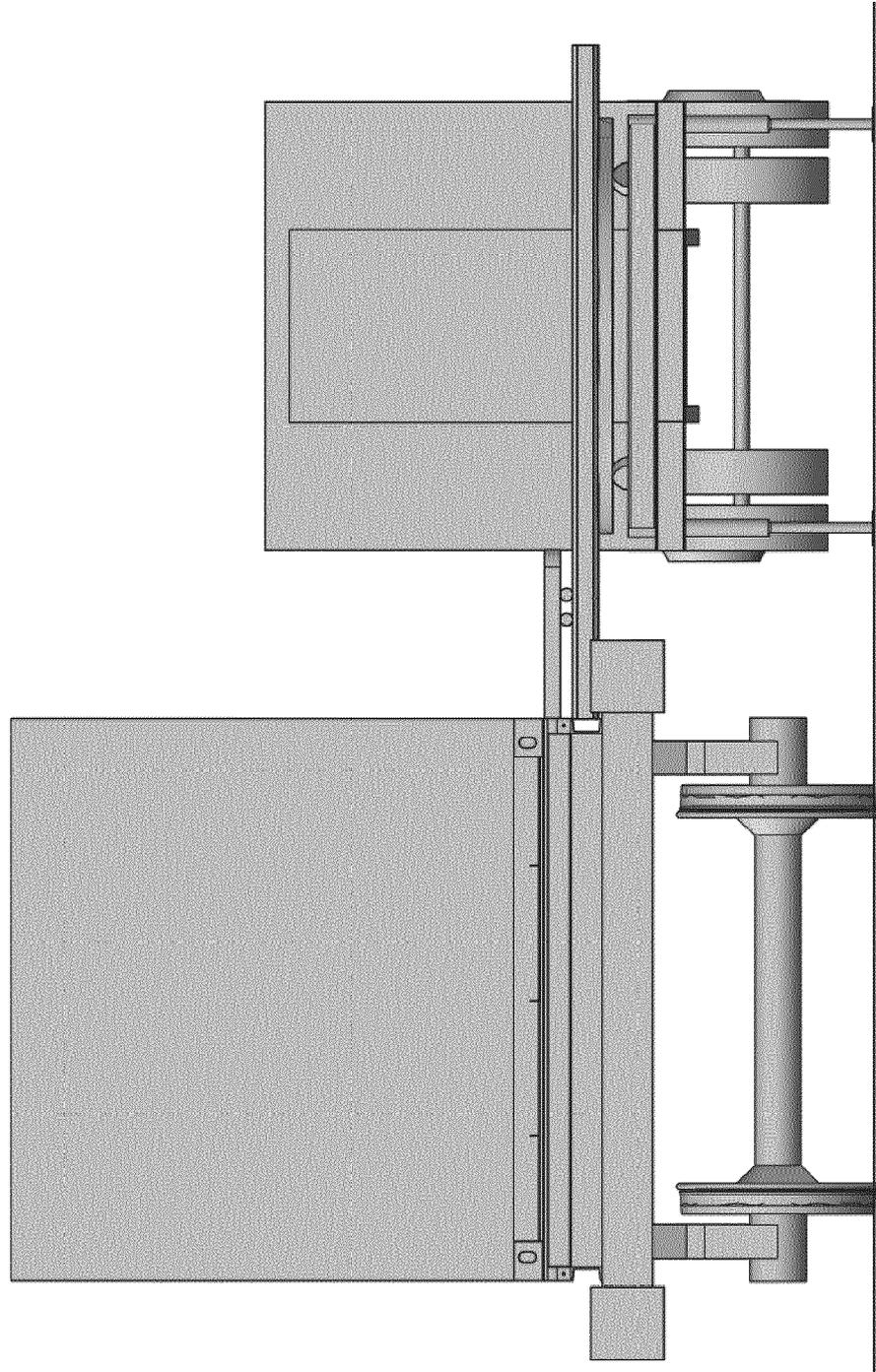


FIG. 7-4

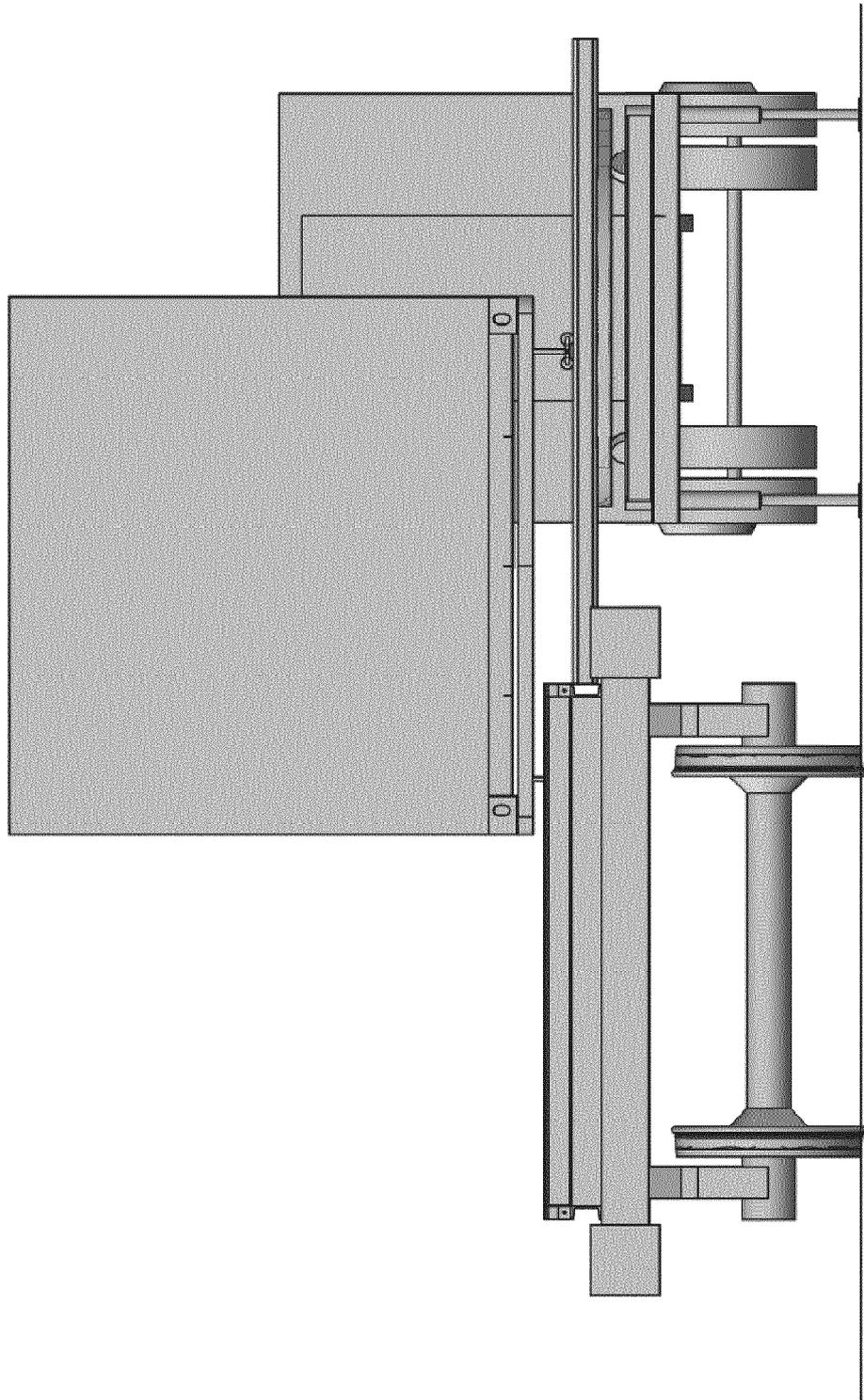


FIG. 7-5

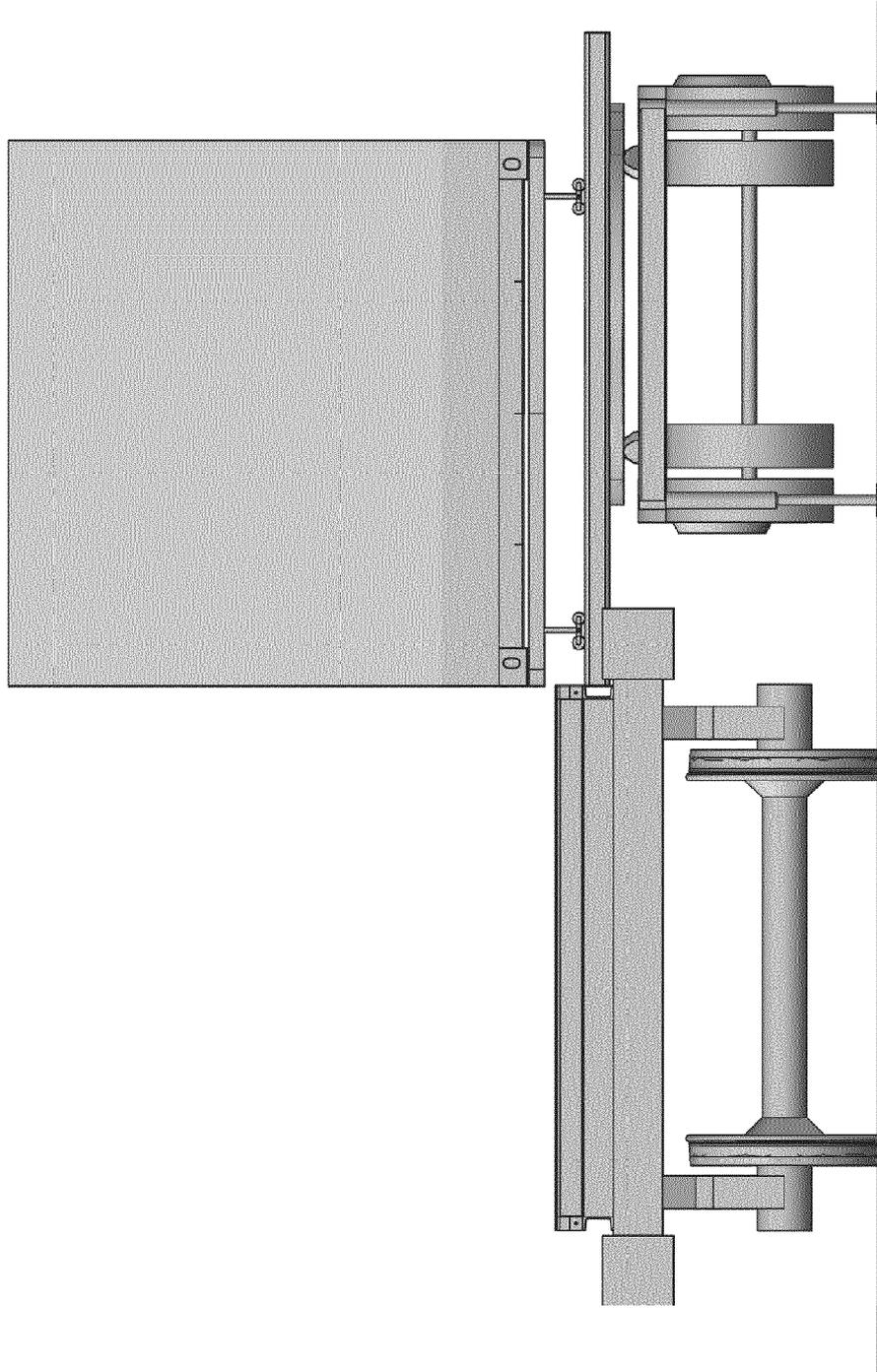
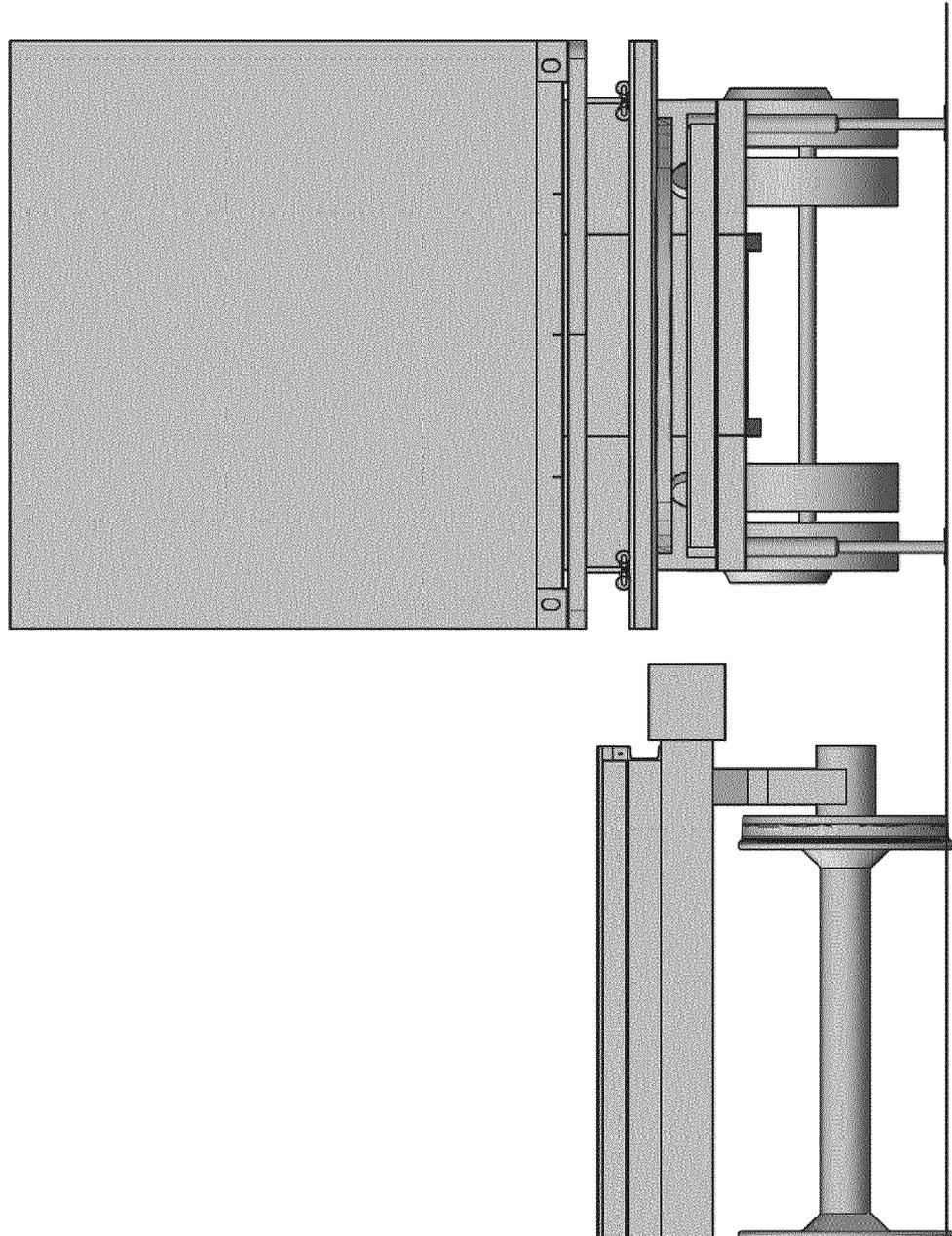


FIG. 7-6



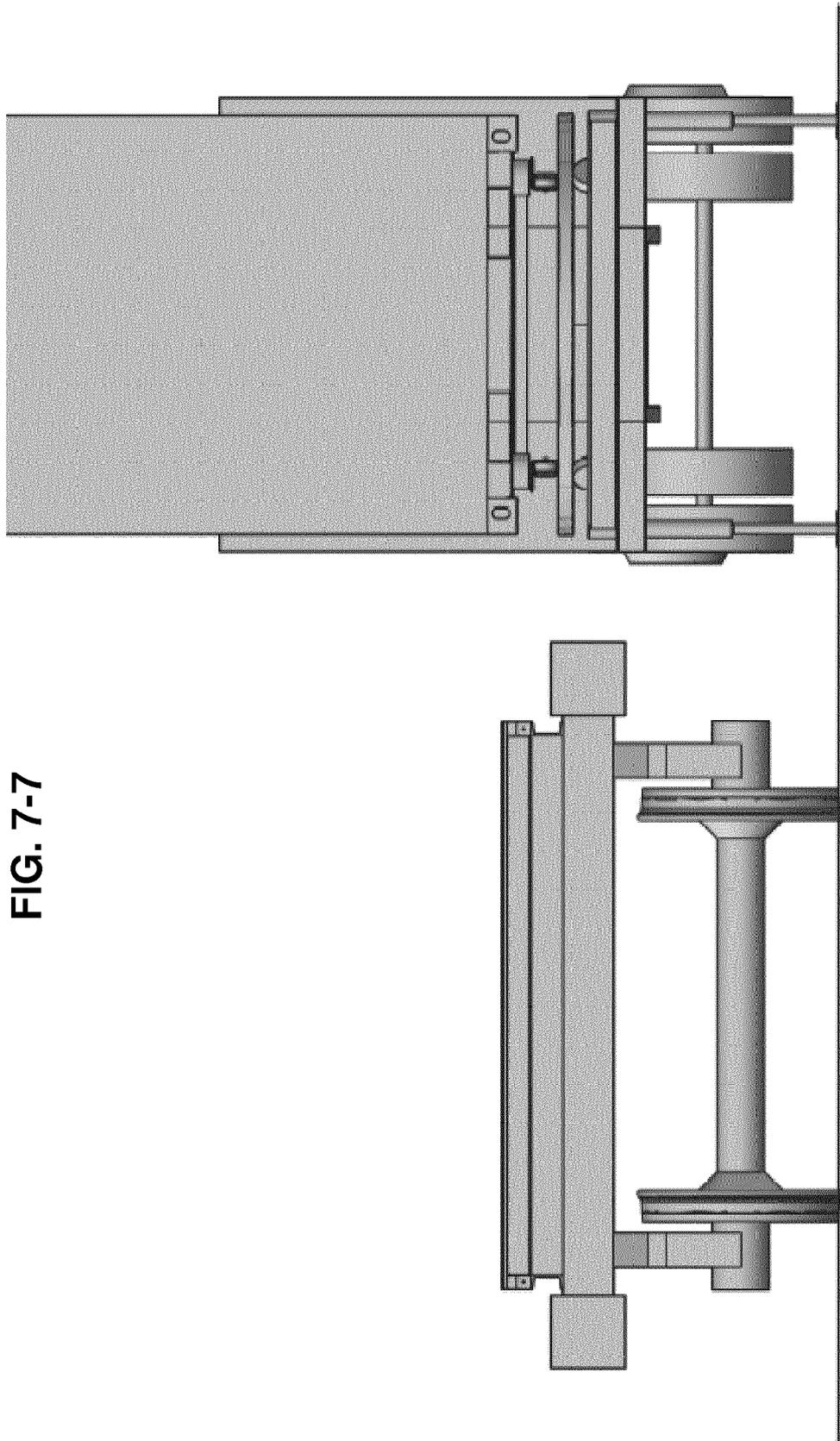


FIG. 7-7

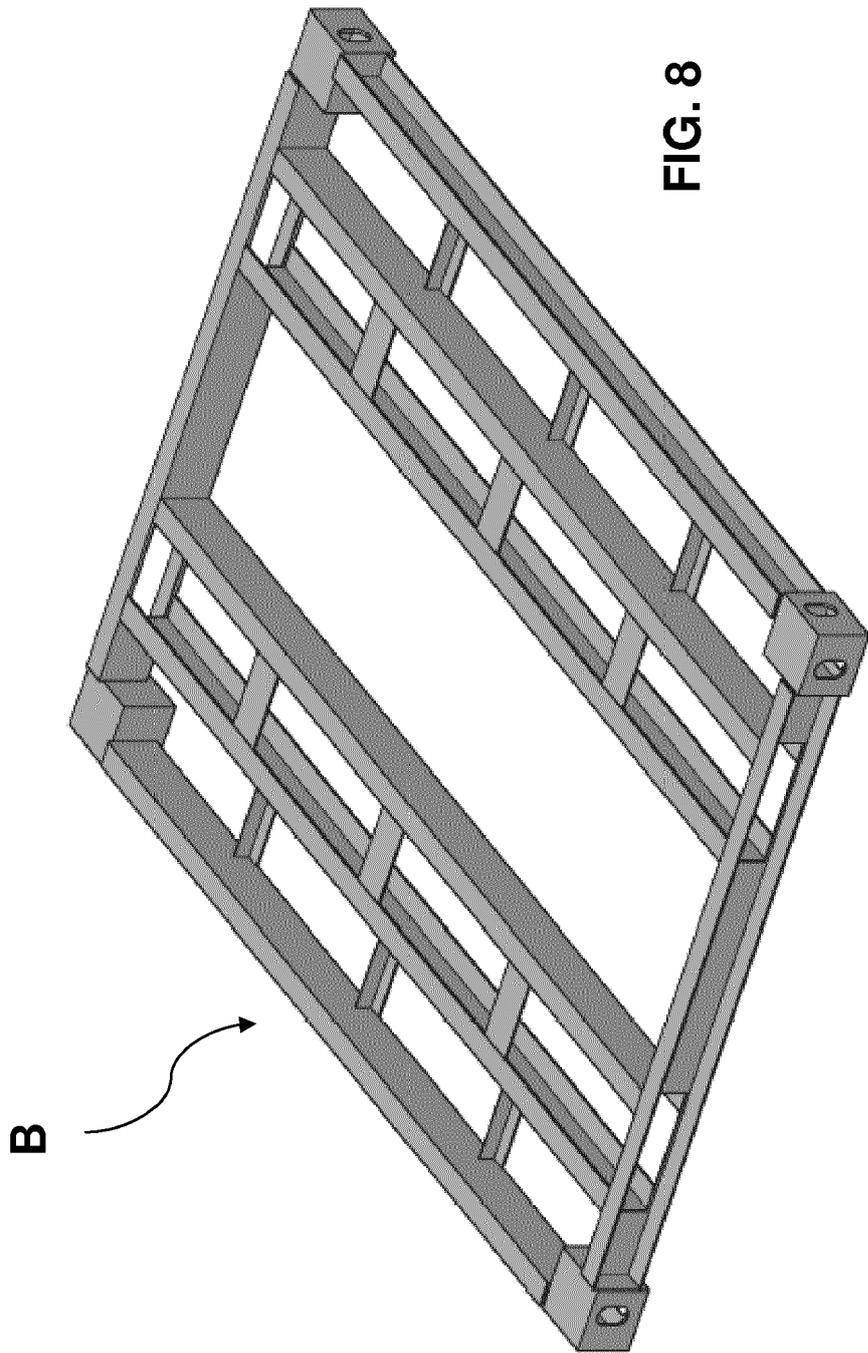


FIG. 9

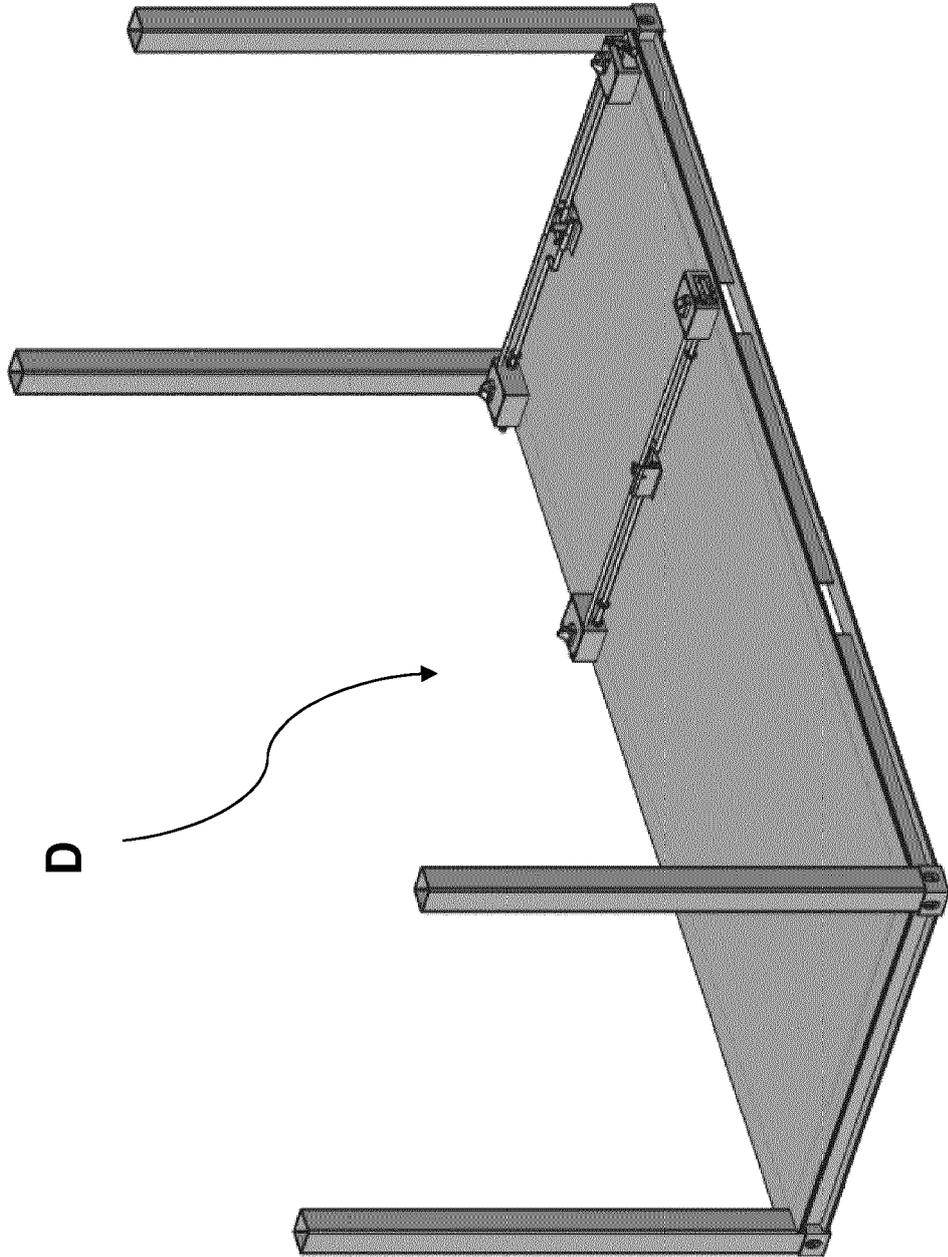


FIG. 10-1

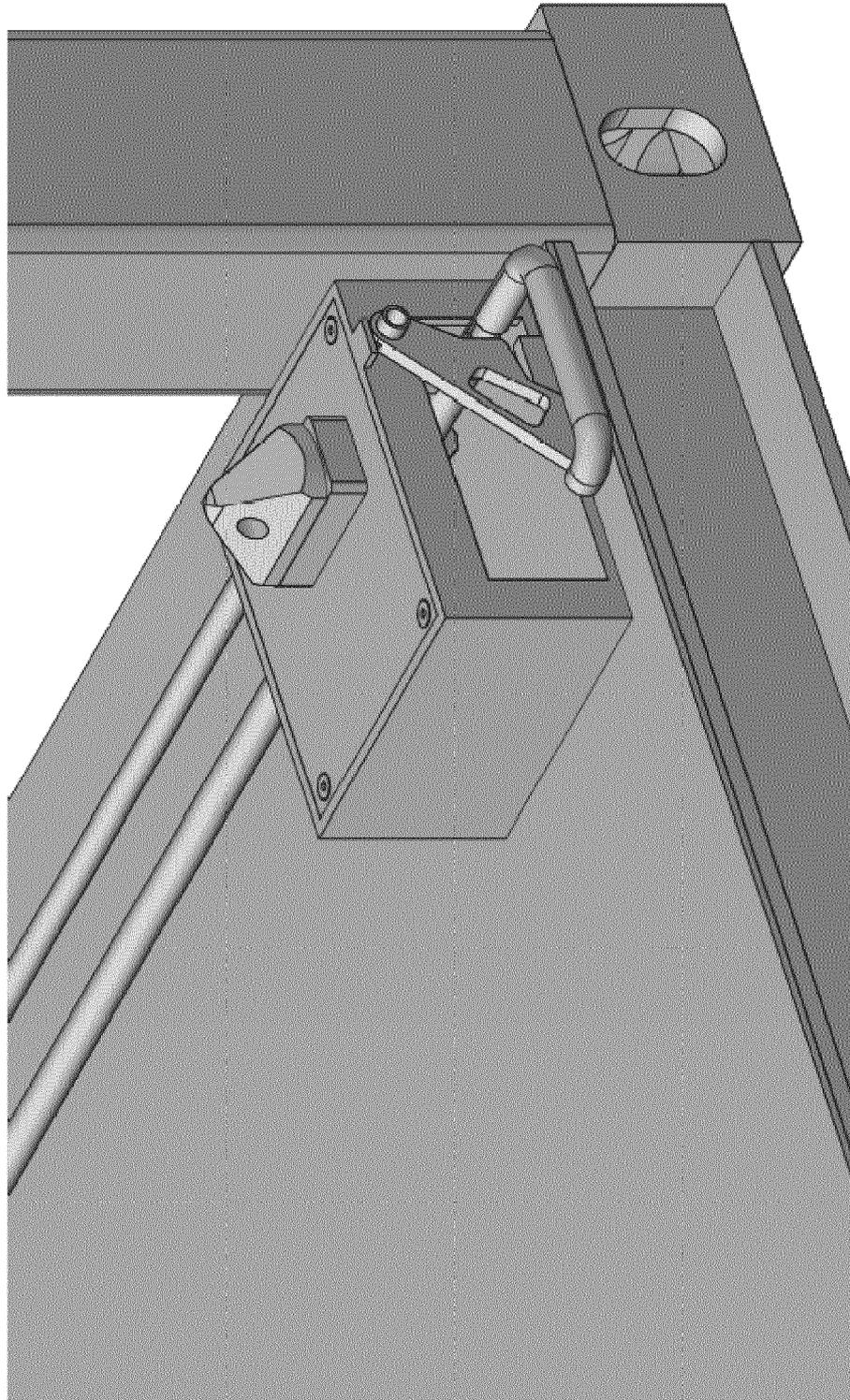


FIG. 10-2

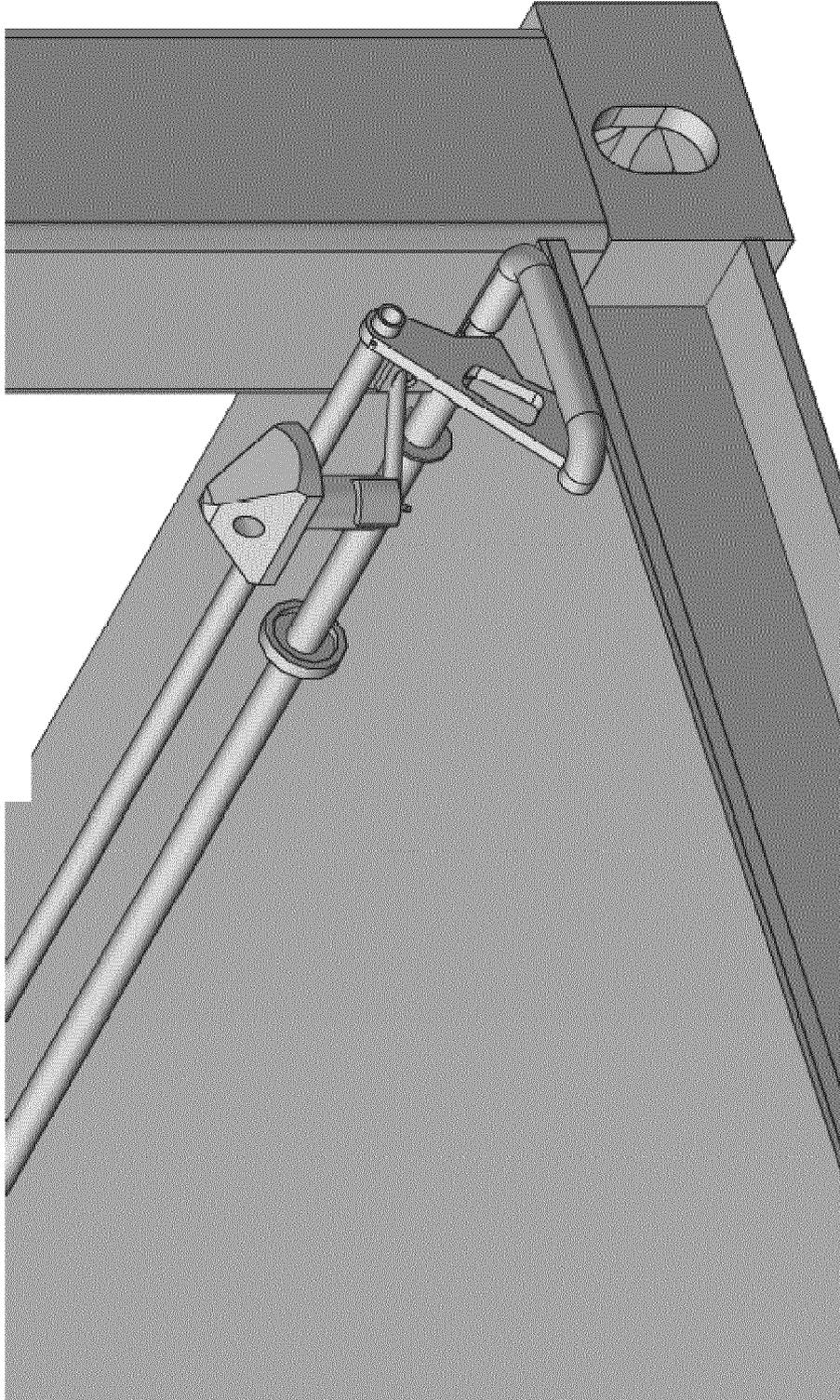
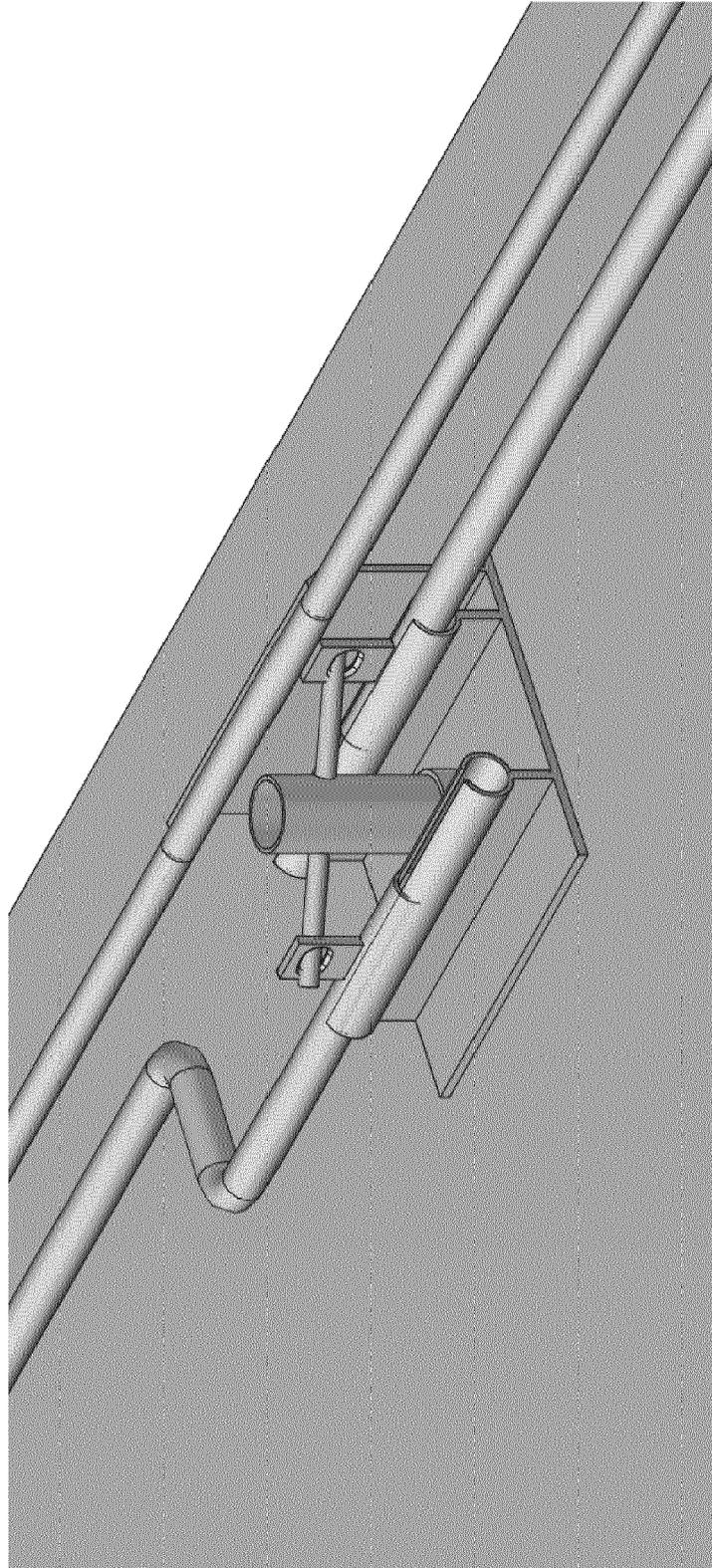


FIG. 11





EUROPEAN SEARCH REPORT

Application Number  
EP 14 16 1283

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A	----- DE 86 17 393 U1 (WILCKE HANS) 28 August 1986 (1986-08-28) * figure 1 *	1	
A	----- EP 0 285 698 A1 (PAUL JOSEF) 12 October 1988 (1988-10-12) * figure 7 *	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			B60P
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 13 June 2014	Examiner Lorandi, Lorenzo
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document	

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