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(54) **Device for clamping loads for lift trucks**

Vorrichtung zum Greifen von Lasten für Gabelstapler

Dispositif de serrage de charges pour chariots élévateurs

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(73) Proprietor: **CASCADE ITALIA S.r.l.
37050 Vago di Lavagno (VR) (IT)**

(72) Inventor: **Roncari, Davide
37050, VAGO DI LAVAGNO (VR) (IT)**

(74) Representative: **Fisauli, Beatrice A. M.
Con Lor S.p.A
Via Renato Fucini, 5
20133 Milano (IT)**

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Description

[0001] This present invention relates to a device for collecting and clamping loads for lift trucks or the like that allow to hoist and handle loads in the form of packages and, in particular, packed household appliances, inside warehouses and storehouses where goods are stored.

[0002] The innovation in question finds specific application in the sector of storage and handling of large household appliances such as refrigerators, dishwashers, washing machines but also small appliances such as microwave ovens, televisions or any other package that is usually but not necessarily prismatic in form, to be moved both individually and together with others.

[0003] As is known lift trucks are self-propelled machines designed to handle packages mainly in storage warehouses or storehouses containing materials of a wide variety of types.

[0004] Known lift trucks include, on their fronts, plates which permit them to grasp packages to be handled only if said packages have vertical dimensions comparable to those of the plates, to avoid the packages from slipping out or being crushed given that no uniform pressure is being exerted on their side surfaces by the plates.

[0005] US 3 643 827 discloses a clamp attachment especially for lift trucks in which the elements of each of a pair of pivotal clamp pad and supporting clamp arm assembly provide a substantially coplanar and continuous clamping surface.

[0006] The scope and function of the invention is to overcome the previously described problems and others by providing for a collecting and clamping device, that allows to hoist and move one or more loads, composed of two vertical opposed plates coupled to sliding elements designed to slide on horizontal guides, said plates each including a grasping jaw, each one comprising at least two separate pressure elements machined in a monolithic body spreading out frontally from each of said grasping jaws, being coupled to a grasping segment made of elastic material to which it exerts pressure, each of said segment being placed on the internal side of each jaw, characterized by the fact that said grasping segments are preloaded so that they are elastically deformed and form a concave surface with respect to said loads.

[0007] Thus the device is able to hoist and move one or more packages of different size and/or shapes and/or positioned according to whatever layout in the volume that is laterally defined by the two completely outspread plates.

[0008] The combination of the central position of the sliding elements with respect to the plates and the presence of at least two pressure elements provides uniform distribution, over the area of the grasping segments, of the pressure generated by clamping the plates on the packages to be hoisted and transported so that there are no important specific pressure gradients, with respect to the average value, which could generate either the risk of crushing the packages, if positive, or a less efficient

grasping effect on the packages, if negative.

[0009] In addition, thanks to the convex shape (concave surface) generated by preload of the grasping segments, the invention is able to exert, on the upper and lower ends of the packages hoisted and transported, compound horizontal and vertical pressure that provides improved retention of the packages.

[0010] Said preload advantageously provides, in this innovation, a limited but effective elastic deformation capacity by said grasping segments when these clamp on the packages to be hoisted and transported in order to avoid the risk of crushing them.

[0011] The invention, therefore, avoids the risk of package slipping or crushing that exists with the known technique.

[0012] Other characteristics of the invention can be better understood from the following description which is given as a non-limiting example and which refers to the attached drawings where:

Fig. 1 gives a schematic view of the front side of the clamping device according to the invention;

Fig. 2 gives a schematic view of the left side of the device;

Fig. 3 gives a schematic view of the right side of the device;

Fig. 4 is an axonometric view of the left side of the device.

[0013] Number 1, with reference to the attached illustrations, indicates a clamping device that allows to hoist and move loads of whatever shape, and in particular with a basically prismatic form, composed of two vertical opposed plates 2 and 3 each coupled to two sliding elements 4 and 5 each designed to slide on horizontal guides 6 and 7 in a manner controlled by the user by specific controls (not illustrated because they are known). Said sliding elements 4 and 5 are placed in a central position with respect to said plates 2 and 3 which each includes grasping jaw 8, 9 shaped in order to have three separate pressure elements 10, 11 machined in a monolithic body so that they spread out at least forward from each of said grasping jaws 8, 9. Each grasping jaw 8, 9 exerts pressure on a respective grasping segment 12, 13 made of elastic material to which it is connected and designed to be preloaded so that it is placed on a concave surface (not shown in the figures) with respect to said loads, generating the technical effect of exerting basically uniform pressure on each point of contact between said grasping segment 12, 13 and said loads. Consequently the device is able to hoist and move one or more packages of different size and/or shapes and/or positioned according to whatever layout in the volume that is laterally defined by the two completely outspread plates.

[0014] More specifically said horizontal axis sliding elements 4 and 5 slide on said horizontal guides 6 and 7 (see fig. 1) in a transversal direction with respect to the front part of the vehicle, making movements in two op-

posite directions in a reciprocal approach or distancing motion and each grasping segment 12, 13 has a surface suitable for grasping the packages to be transported.

[0015] In a preferred embodiment, illustrated in figure 1, the grasping segments 12, 13 are reciprocally facing each other and occupy the same surface area and are consequently symmetrical and specular with respect to the center of gravity of the lift truck on which they are mounted.

[0016] The packages to transport are therefore laterally retained between said plates which are provided with suitable anti-slip seals designed for the purpose and package grasping and retaining are ensured by the equal and contrasting thrust received from the pistons placed on horizontal guides 6 and 7.

[0017] As a consequence to retain the packages the grasping segments 12, 13 come closer to each other whereas to release the packages the plates move apart while the package is deposited on the floor or on a specific support.

[0018] It is therefore sufficient, to use the system described, to introduce between the open grasping segments 12, 13 the package or packages to be transported and to control the plates to come together until they contact.

[0019] The combination of the central position of sliding elements 4 and 5 with respect to plates 2 and 3 and the presence of three or more pressure elements 10, 11 provides uniform distribution over the area of grasping segments 12 and 13 of the pressure generated by clamping plates 2 and 3 on the packages to be hoisted and transported so that there are no important specific pressure gradients with respect to the average value, which could generate either the risk of crushing the packages, if positive, or a less efficient grasping effect on the packages, if negative.

[0020] The grasping segments 12, 13 are made of elastic material and, being preloaded, they have a convex shape which creates a cavity. As a consequence, the invention is able to exert, on the upper and lower ends of the packages hoisted and transported, compound horizontal and vertical pressure that provides improved retention of the packages.

[0021] Said preload advantageously provides, in this innovation, a limited but effective elastic deformation capacity by said grasping segments 12 and 13 that avoids the risk of crushing the packages when these clamp on the packages to be hoisted and transported.

[0022] The cavity of the grasping elements 12, 13 lengthens both in horizontal direction and in vertical direction. In particular the vertical radii of curvature are greater than or equal to the horizontal radii of curvature.

[0023] In a preferred embodiment illustrated in figures 2, 3 and 4 each of said grasping jaws 10, 11 is coupled and hinged to a covering element 14, 15 using means of connection and fastening, such as, for example a vertical pin, indicated by the reference number 19 in figure 4, coupled to the front ends of said pressure elements 10

and 11. Said covering element 14, 15, being in contact with the grasping segments 12 and 13, generates a more effective uniform distribution of clamping pressure on grasping segments 12 and 13.

[0024] Thanks to the coupling elements 14, 15 to the related jaw it is possible to vary the dimension of the cavity of the grasping segments 12 and 13.

[0025] In the example illustrated said pressure elements 10 and 11 spread out from their relevant grasping jaw 8, 9 like the fingers from the palm of a hand.

[0026] They have about equal dimensions and are preferably but not exclusively odd in number and can be, for example, three as in figures 2 and 3.

[0027] The pressure elements 10, 11 are partially covered and connected together by specific flat shaped connecting elements 16, 16' and 17, 17' (see figures 2 and 3).

[0028] In another possible embodiment the presence of at least one proportional valve or at least one mechanical valve or at least another similar device is advantageously provided and functions to give the pistons the mechanical control to move the plates.

[0029] A technician in the sector may foresee several modifications and variations to what has been described and illustrated, obtaining solutions that are to be held to be included within the realm of protection of the invention which is further defined, in its specific characteristics, by the following claims.

30 Claims

1. Collecting and clamping device that allows to hoist and move one or more loads, composed of two vertical opposed plates (2,3) coupled to sliding elements (4,5) designed to slide on horizontal guides (6,7), said plates (2,3) each including a grasping jaw (8,9), each one comprising at least two separate pressure elements (10, 11) machined in a monolithic body spreading out frontally from each of said grasping jaws (8,9), being coupled to a grasping segment (12, 13) made of elastic material to which it exerts pressure, each of said segment (12, 13) being placed on the internal side of each jaw (8, 9), **characterized by** the fact that said grasping segments (12, 13) are preloaded so that they are elastically deformed and form a concave surface with respect to said loads.
2. Collecting and clamping device according to claim 1, wherein each of said grasping jaws (8,9) is coupled and hinged to a jointed element (14,15), by connection and fastening means (19) at the front ends of said pressure elements (10,11) and said jointed element (14,15) is in contact with said grasping segments (12,13).
3. Collecting and clamping device according to claim 2, wherein the dimension of the cavity of the grasping segments (12, 13) can be varied thanks to said cou-

pling of said jointed elements (14, 15) to said grasping jaws (8,9).

4. Collecting and clamping device according to claim 2 or 3, wherein in the pressure elements (10,11) a passing hole is obtained in which a pin (19) is inserted in order to connect the jointed elements (14,15) in which passing holes are obtained for the insertion of said pin (19).
5. Collecting and clamping device according to one of the preceding claims, wherein said pressure elements (10,11) are covered and connected together by connection elements (16,16') and (17,17').
6. Collecting and clamping device according to one of the preceding claims, wherein in each jaw (8, 9) said pressure elements (10, 11) are in an odd number.
7. Collecting and clamping device according to one of the preceding claims, wherein said basically concave surface has vertical radii of curvature greater than or equal to the horizontal radii of curvature.
8. Collecting and clamping device according to one of the preceding claims, wherein said concave surface has variable vertical radii of curvature and constant horizontal radii of curvature.
9. Collecting and clamping device according to one of the preceding claims, wherein the sliding elements (4,5) are placed in a central position with respect to each plate (3,4).

Patentansprüche

1. Sammel- und Klemmeinrichtung, die es erlaubt, eine oder mehrere Lasten anzuheben und zu bewegen, umfassend zwei vertikal gegenüberliegende Platten (2, 3), die mit Gleitelementen (4,5) gekoppelt sind, die zum Gleiten auf horizontalen Führungen (6, 7) ausgebildet sind, wobei die Platten (2, 3) jeweils eine Greifbacke (8, 9) umfassen, die jeweils zumindest zwei separate Druckelemente (10, 11) beinhaltet, die sich als monolithisch hergestellte Körper frontal von jedem der Greifbacken erstrecken, die mit einem Greifsegment (12, 13) aus elastischem Material gekoppelt sind, auf das sie einen Druck ausüben, wobei jedes der Greifsegmente (12, 13) auf der Innenseite der jeweiligen Greifbacke (8, 9) angeordnet sind, **dadurch gekennzeichnet**, dass die Greifsegmente (12, 13) vorgespannt sind, so dass sie elastisch deformiert werden und bezüglich der Lasten eine konkave Oberfläche ausbilden.
2. Sammel- und Klemmeinrichtung nach Anspruch 1, wobei jede der Greifbacken (8, 9) mit einem gelen-

kigen Element (14, 15) durch Verbindungs- und Befestigungsmittel (19) an den Vorderseiten der Druckelemente (10, 11) schwenkbar gekoppelt ist und die gelenkigen Elemente (14, 15) in Kontakt mit den Greifsegmenten (12, 13) stehen.

3. Sammel- und Klemmeinrichtung nach Anspruch 2, wobei die Dimension der Aussparung in den Greifsegmenten (12, 13) aufgrund der Verbindung zwischen den gelenkigen Elementen (14, 15) und den Greifbacken (8, 9) variierbar ist.
4. Sammel- und Klemmeinrichtung nach Anspruch 2 oder 3, wobei in den Druckelementen (10, 11) eine Aufnahmebohrung vorgesehen ist, in die ein Stift (19) eingesetzt ist, um die gelenkigen Elemente (14, 15) zu verbinden, in denen Aufnahmebohrungen für die Einfügung des Stifts (19) vorgesehen sind.
5. Sammel- und Klemmeinrichtung nach einem der vorhergehenden Ansprüche, wobei die Druckelemente (10, 11) durch Verbindungselemente (16, 16', 17, 17') abgedeckt und verbunden sind.
6. Sammel- und Klemmeinrichtung nach einem der vorhergehenden Ansprüche, wobei jede Greifbacke (8, 9) eine ungerade Anzahl von Druckelementen (10, 11) aufweist.
7. Sammel- und Klemmeinrichtung nach einem der vorhergehenden Ansprüche, wobei die im Wesentlichen konkave Oberfläche vertikale Krümmungsradien aufweist, die gleich oder größer der horizontalen Krümmungsradien sind.
8. Sammel- und Klemmeinrichtung nach einem der vorgehenden Ansprüche, wobei die konkave Oberfläche einstellbare vertikale Krümmungsradien und konstante horizontale Krümmungsradien aufweist.
9. Sammel- und Klemmeinrichtung nach einem der vorhergehenden Ansprüche, wobei die Gleitelemente (4, 5) bezogen auf jede Platte (3, 4) in zentraler Position angeordnet sind.

Revendications

1. Dispositif de saisie et de serrage qui permet de soulever et déplacer une ou plusieurs charges, ledit dispositif étant constitué de deux plaques verticales opposées (2, 3) couplées à des éléments coulissants (4, 5) conçus pour coulisser sur des guides horizontaux (6, 7), lesdites plaques (2, 3) incluant chacune une mâchoire de préhension (8, 9), chacune d'elles comprenant au moins deux éléments de pression séparés (10, 11) usinés dans un corps monolithique s'étendant à l'avant depuis chacune desdites mâ-

choires de préhension (8, 9), couplée à un segment de préhension (12, 13) en matériau élastique sur lequel elle exerce une pression, chacun desdits segments (12, 13) étant placé du côté intérieur de chaque mâchoire (8, 9), **caractérisé en ce que** lesdits segments de préhension (12, 13) sont préchargés de telle sorte qu'ils sont déformés élastiquement et forment une surface concave par rapport audites charges.

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coulissants (4, 5) sont placés en position centrale par rapport à chaque plaque (3, 4).

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2. Dispositif de saisie et de serrage selon la revendication 1, dans lequel chacune desdites mâchoires de préhension (8, 9) est couplée et reliée de façon articulée à un élément articulé (14, 15), par des moyens de raccordement et de fixation (19), aux extrémités avant desdits éléments de pression (10, 11) et ledit élément articulé (14, 15) est en contact avec lesdits segments de préhension (12, 13).

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3. Dispositif de saisie et de serrage selon la revendication 2, dans lequel la dimension de la cavité des segments de préhension (12, 13) peut varier grâce au couplage desdits éléments articulés (14, 15) auxdites mâchoires de préhension (8, 9).

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4. Dispositif de saisie et de serrage selon la revendication 2 ou 3, dans lequel dans les éléments de pression (10, 11) est ménagé un trou de passage dans lequel une tige (19) est insérée afin de raccorder les éléments articulés (14, 15) dans lesquels des trous de passage sont ménagés en vue de l'insertion de ladite tige (19).

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5. Dispositif de saisie et de serrage selon l'une des revendications précédentes, dans lequel lesdits éléments de pression (10, 11) sont recouverts et raccordés ensemble par des éléments de raccordement (16, 16') et (17, 17').

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6. Dispositif de saisie et de serrage selon l'une des revendications précédentes, dans lequel dans chaque mâchoire (8, 9) lesdits éléments de pression (10, 11) sont en nombre impair.

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7. Dispositif de saisie et de serrage selon l'une des revendications précédentes, dans lequel ladite surface pratiquement concave a des rayons de courbure verticaux supérieurs ou égaux aux rayons de courbure horizontaux.

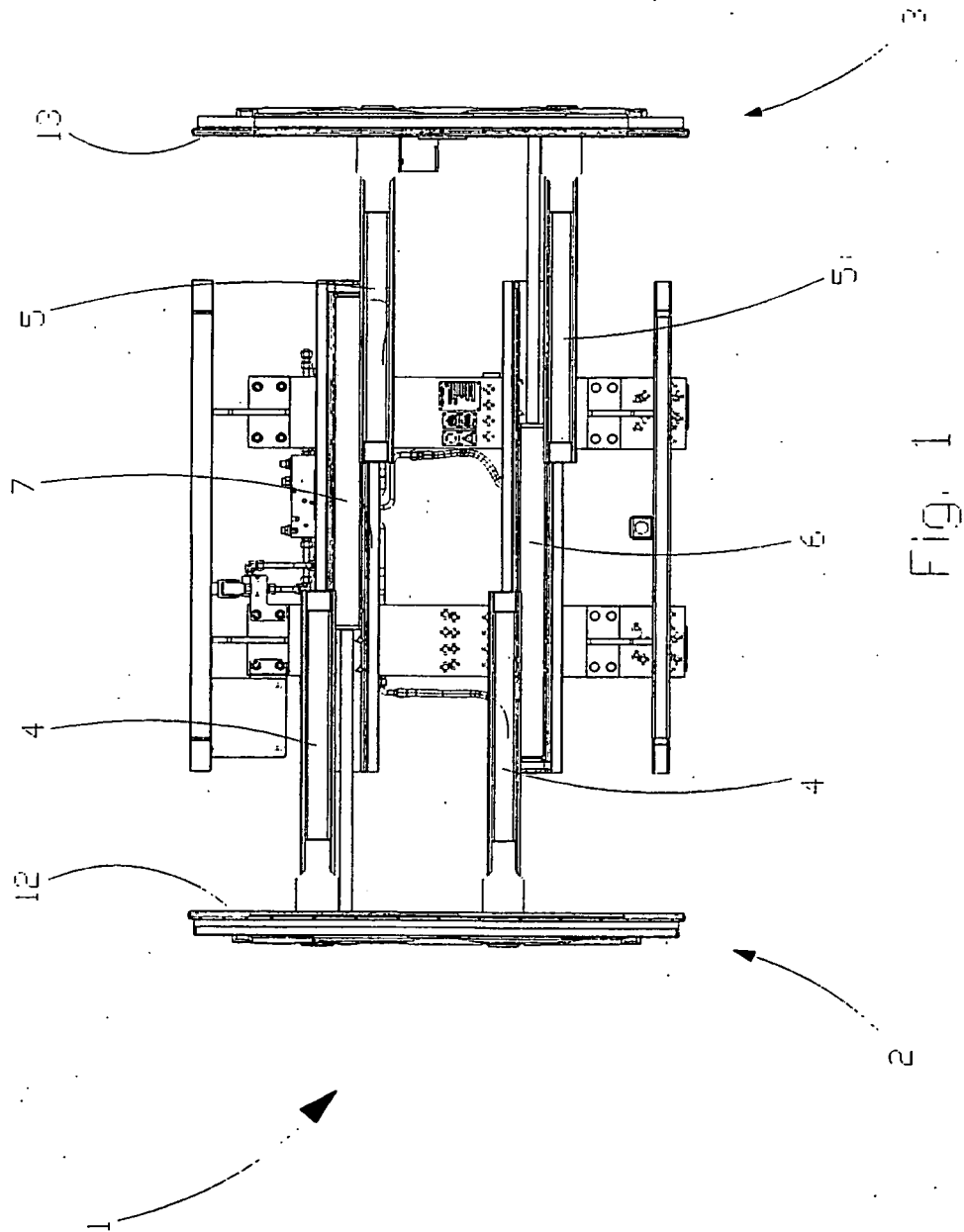
45

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8. Dispositif de saisie et de serrage selon l'une des revendications précédentes, dans lequel ladite surface concave a des rayons de courbure verticaux variables et des rayons de courbure horizontaux constants.

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9. Dispositif de saisie et de serrage selon l'une des revendications précédentes, dans lequel les éléments



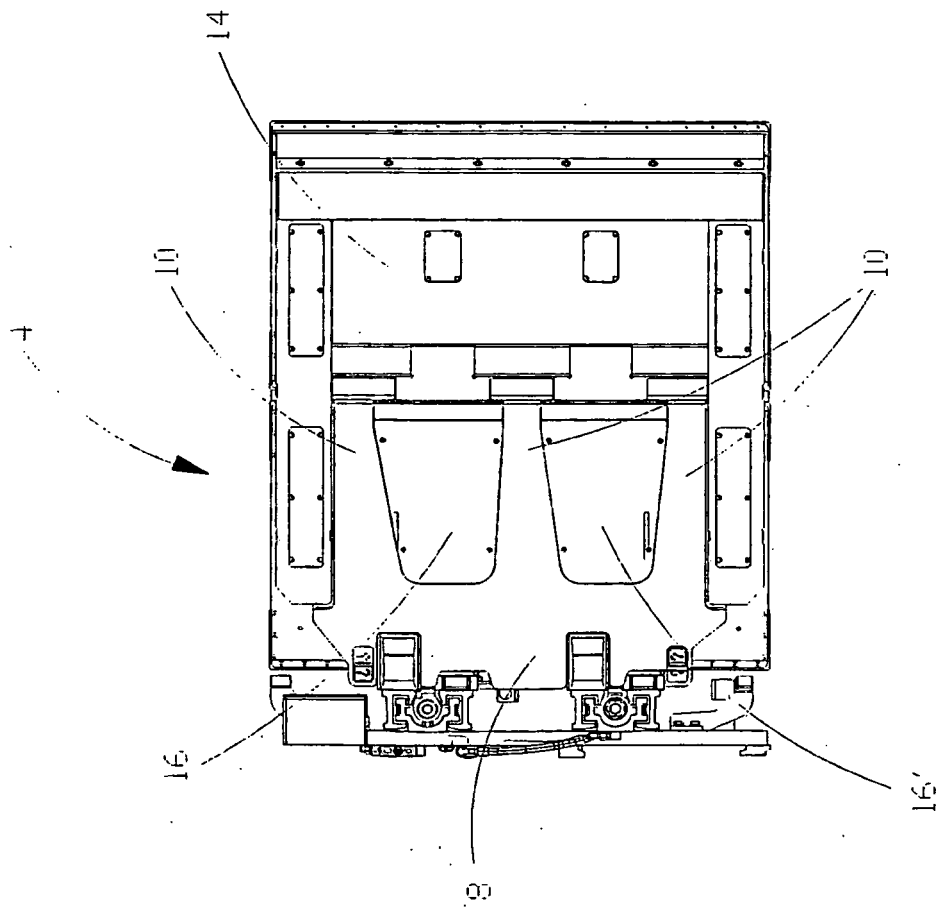


Fig. 2

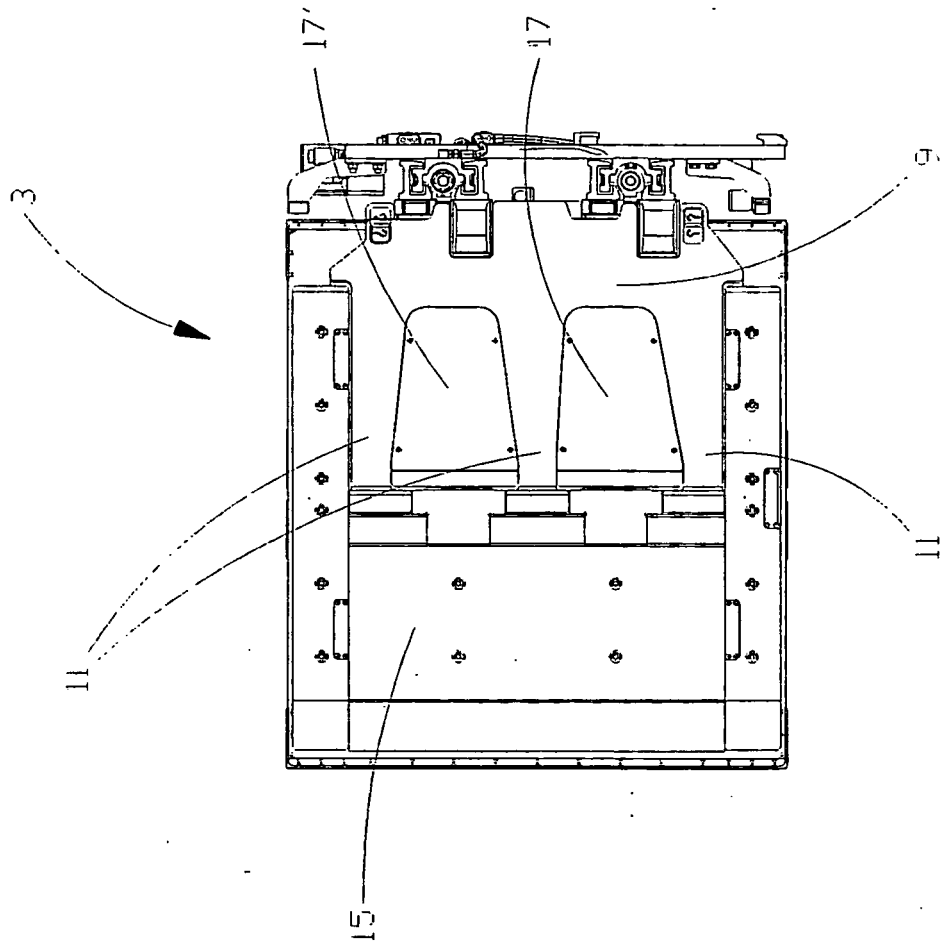


FIG. 3

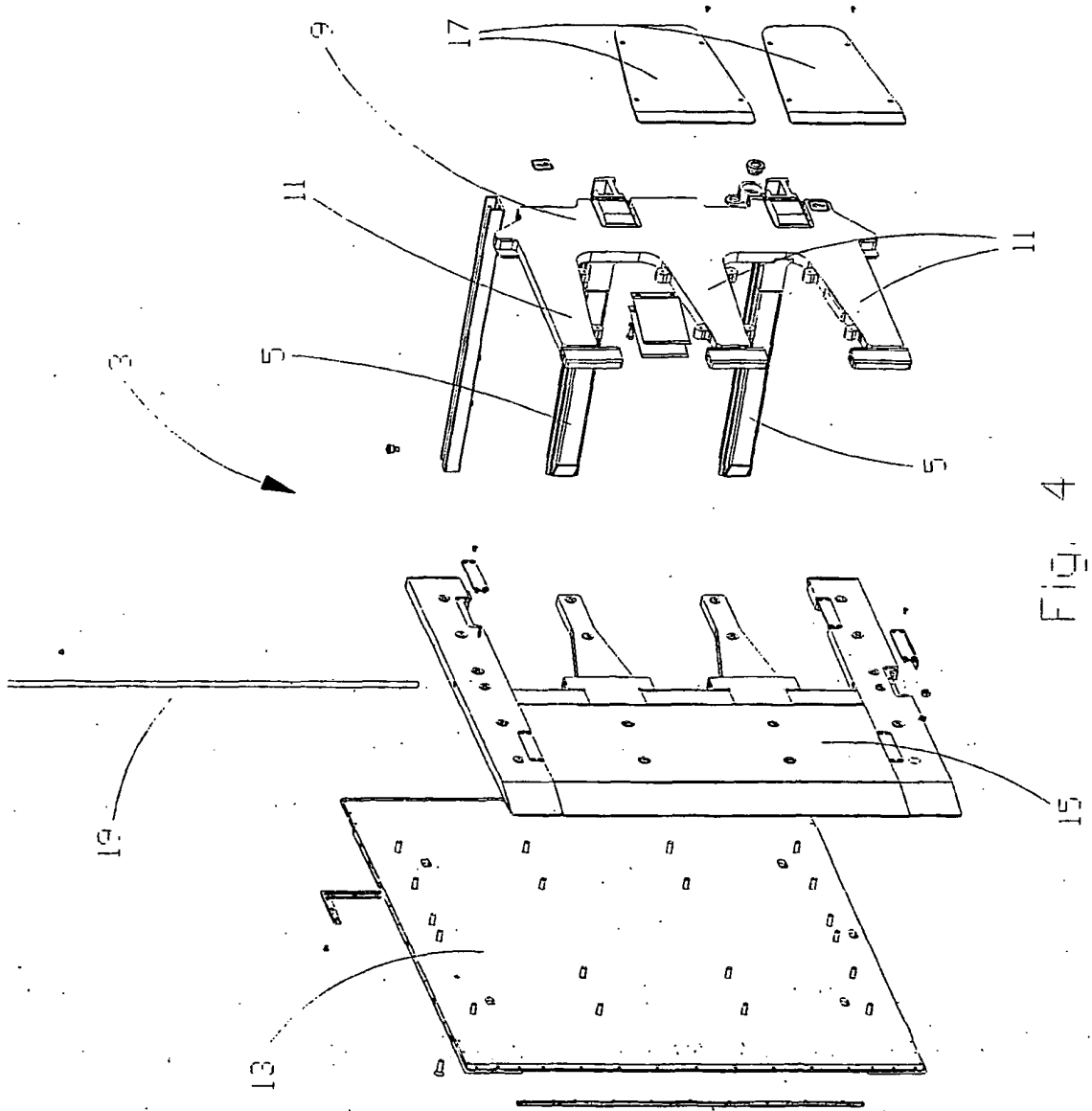


Fig. 4

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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