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A request for correction of the description where figure 5 should read figure 4 has been filed pursuant to Rule 139 EPC. A decision on the request will be taken during the proceedings before the Examining Division (Guidelines for Examination in the EPO, A-V, 3.).

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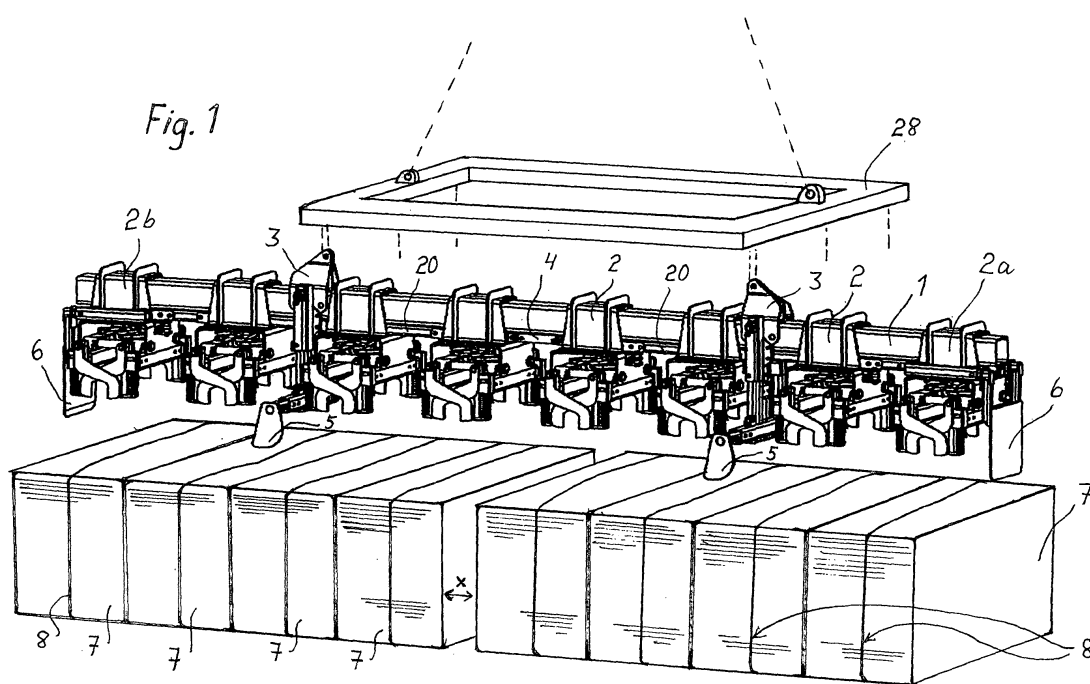
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(54) **A lifting device for cellulose units**

(57) Lifting device for goods, like pulp units (7) which are bound with a binding device (8), comprising at least one horizontal beam (1) which is attached to a crane to which horizontal beam several claw boxes (2) which are moveable in the direction of the beam are attached where each claw box (2) grips a binding device (8) when gripping elements (9,10) of the claw boxes are brought closer to

each other. A moveable two-piece transfer bar (20) for the claw boxes (2) is arranged near the horizontal beam (1) which allows claw boxes to be moved in the direction of the horizontal beam (1) in relation to other claw boxes (2) and where end plates (6) belong to the outermost claw boxes (2a,2b) of the horizontal beam, the distance between which can be reduced with the help of the transfer bar (20).



Description

[0001] The aim of the invention is a lifting device for goods, like pulp units which are bound with a binding device to which lifting device is belonging at least one horizontal balk which is attached to a crane and to which horizontal balk several claw boxes which are moveable in a direction of the mentioned balk are attached in which case each claw box is designed to grip the binding device for an item to be lifted which is located near to it while gripping elements which belong to the boxes are brought closer to each other while a binding element stays to be supported by the gripping elements.

[0002] The pulp units are packages which have the shape of a rectangle in which packages the pulp is transported from a factory to usage targets. The size of the pulp units may vary but they usually weigh about 2,000 kg. The upper surface of the units is usually flat. The unit contains several bales and is bound to stay together with the help of a binding element, such a wire which is wound around the unit.

[0003] Nowadays pulp units are loaded and transferred at harbours or similar locations from a transport vehicle or a intermediate storage to the cargo hold of a ship or the other way round by using harbour crane and a special lifting device attached to it. Usually a longish main balk or similar thing and gripping elements which are attached to it in various ways belong to the lifting device. The lifting device has several (for example 1 - 4) claw boxes and the aim is that several pulp units can be transferred with the lifting device at one go. The pulp units are transferred in such a way that the lifting device is transferred above the pulp unit and it is put down downwards in such a way that the claw boxes touch the binding rims for the pulp units in such a way that the claws which act as gripping elements are located to the opposite sides of the lifting rims. When the claw box rests on the pulp unit, the material of the pulp unit gets squeezed a little and when the claws are transferred to be at the opposite sides of each other, they go under the lifting rims. After that the pulp units can be lifted upwards while being supported by the lifting rims and they can be transported to a cargo hold of a ship or to another desired location.

[0004] From the patent specification US 3587889 a lifting device for pulp units according to the introduction of the claim 1 is known. A horizontal balk which supports the claw boxes which have been installed onto it, belongs to the lifting device. The claw boxes have a structure which prevents wobbling of the load when they are put down onto the load while the lift is being prepared.

[0005] There are several disadvantages connected to the modern lifting devices for the pulps and their usage. When the claw boxes are supported by chains or cables or similar things, the claw boxes may sometimes flutter uncontrollable in relation to the main balks and especially when they are being transferred while they are empty from one place to another. With the help of the modern lifting devices a group of four units can advantageously

be lifted and transferred to a ship. Problems occur when the lifts of the most groups are being performed. In the hold of the ship the unit groups should be arranged close to each other and at the dock while being brought out of the hold, a gap which is at least 100 mm should be arranged between the groups for transferring a group which is performed by a forklift truck. The whole group can be transferred by a forklift truck if it has been separated to a distance of at least 100 mm from another group.

[0006] The aim of the invention is to present a lifting device for pulp units with the help of which several disadvantages related to the current lifting devices can be removed. The aim of the invention is especially to present a lifting device for pulp units with the help of which pulp unit groups can be both lifted and these groups can be arranged close to each other and also a needed amount of groups can be separated from each other.

[0007] The aim of the invention is achieved by means of a lifting device for pulp units and it is characteristic for this invention what is presented in the claims.

[0008] In one advantageous embodiment of the invention there is one horizontal balk or more similar horizontal balks next to it which lift several unit groups at one go. Each horizontal balk comprises claw boxes separated according to the sizes of the units being supported by the balk. The claw boxes can be moved at least according to the unit groups in which case two or more unit groups can be arranged both to a row without gaps and the groups can be arranged in such a way that there is a little distance between them.

[0009] In the following the invention is discussed in more detail by referring to the accompanying drawings in which

Figure 1 shows one lifting device according to the invention which is about to lift two unit groups shown diagonally as a side view.

Figure 2 shows a horizontal balk and the claw boxes as a side view.

Figure 3 shows a side guide unit and the claw box as a view from above, section A - A.

Figure 4 shows a claw box as a side view.

[0010] In the figure 1 a lifting frame 28 which hangs supported by the crane (not shown) is shown to which lifting frame for example three parallel horizontal balks 1 can be attached in order to perform the lifting with them at the same time. Each horizontal balk 1 comprises claw boxes 2 which are arranged with a separation determined by the size of the unit and located on the horizontal balk. End plates 6 belong to the outermost claw boxes 2a, 2b the position of which can advantageously be adjusted according to the size of the unit sideways in relation to the claw boxes 2a, 2b. End plates 6 are located lower than the lower part of the claw boxes 2. Two side control units 5 are attached to the horizontal balk 1 the aim of which is to stop the swinging movement of the lifting device and to position the device on top of the unit groups

which are formed of the units 7.

[0011] Immediately underneath the horizontal balk 1 there is a transfer bar 20 of the claw boxes 2. The transfer bar 20 is in two parts in such a way that its parts are integrated in the middle with a hydraulic cylinder 4. With the help of the cylinder 4 the left and right parts of the transfer bar can be brought closer towards each other and brought further away from each other. When the claw boxes 2 are adjusted in such a way that they can slide and they are being supported by the horizontal balk 1 and each of them are attached to the transfer bar 20 where they are located, groups which are formed of four claw boxes are moveable towards each other and away from each other with the help of the cylinder 4 according to the figure 1.

[0012] The end plates which belong to the outermost claw boxes 2a, 2b have several tasks. Firstly the wobbling of the whole lifting device can be stopped by putting the lifting device down to the ground for a moment to be supported by the end plates 6. Further two or more unit groups can be compressed to be one unit row by putting down the horizontal balk 1 onto the unit row in which case the unit row becomes squeezed to be shorter with the help of the end plates. Before that the transfer bar 20 is driven to its longest position with the help of a cylinder 4 and when the cylinder 4 is squeezed, it is driven shorter. In this way two or more bale groups can be arranged to be one long group and they can be transferred to the ship without the groups having a distance x between them which is about 100 - 200 mm.

[0013] When the above mentioned long unit group is being lifted from the ship to the dock, it can be separated into groups again, if needed, which is performed in such a way that before the units get put down to the ground, a needed distance is arranged with the help of a cylinder 4 by moving the parts of a transfer bar 20 into the middle of the unit row in which case two unit groups which are ready to be put down to the ground, can be achieved.

[0014] There is a binding element 8 around the units 7 and by gripping it with the gripping elements of the claw boxes the unit can be arranged to be lifted.

[0015] In figure 2 claw boxes 2 which are attached to the horizontal balk 1 are shown to which claw boxes two pairs of gripping claws 10 belong while the pairs are a distance apart from each other. Further the claws 10 are a distance apart from each other and can be brought closer to each other in which case they take the binding element between them from the surface of the unit onto the claws while they have been put down onto the unit.

[0016] In figure 2 also the attachment of the side control unit 5 to the horizontal balk 1 is shown. With the help of a sliding casing 3 which is supported by the horizontal balk. The side control unit is attached to a transfer bar 20 which goes underneath the horizontal balk 1 in which case it moves sideways like the claw boxes while the transfer bar 20 is being moved.

[0017] In figure 3 the adjustment of the position in relation to the distance of the side guide unit 5 with the help

of a telescopically implemented attachment way by moving the shaft 12 in a tube 16 and by locking the shaft to the tube through the holes 15 for example with taps. The side guide unit 5 can be put down with the help of the cylinder 13 and telescopic slide bar attachments 14 in order to get support from the unit row and it is not an uplifted barrier when the unit load is put down next to the other unit row completely close to it. The guide unit 5 is attached with the help of a hinge 29 to the shaft 12 so that it can turn in which case it possibly turns and withdraws while it is being put down and when it touches an barrier due to its design. The side guide unit assembly becomes attached to a structure 3 which slides supported by the horizontal balk 1 and also on the other hand to the transfer bar 20 through the brackets 17 (Figure 2).

[0018] In figure 5 the structure of the gripping elements 10, 19 is shown in more detail. While a claw box 2 is being put down onto a unit 7, each gripping element 19 can separately withdraw upwards against the spring 11 and its own weight. With this procedure the functioning of the gripping elements 10, 19 on an uneven unit surface can be ensured and the functioning especially in big unit rows in which there are for example 8 - 12 units in a row and one horizontal balk with its claw box is put down onto them in which case also in that case the claw 10 which is located at the lower end of each gripping element 19 should be on the surface of the unit.

[0019] When the claw boxes 2 are on top of the units, the binding elements 8 of the units between the gripping elements 10, 19 are on the surface of the units. The gripping elements 10, 19 are moved towards each other so that they almost touch each other in which case at least the claw parts 10 will be overlapping. The horizontal balks 24, which can be moved inside the tubes 23, belong to the shafts 19 of the gripping elements and thus the distance of the gripping element pairs on the surface of the bale can be adjusted, if needed. The locking of the adjustment is made either with a bolt or with a locking where a tap is put into a hole.

[0020] Regarding the gripping element pair the pulling of the shafts 19 close to each other and the fact that the binding device will be supported by the claws 10 is made with the help of a hydraulic cylinder which is inside the body 27 of the claw box. With the help of the hydraulic cylinder the horizontal tubes 23 which are located on both sides of the structure are pulled in such a way that they almost touch each other. The gripping element arrangement becomes thus narrower in its entirety inside the body 27 supported by two horizontal axes 18 when the tags 26 slide towards each other on top of the mentioned axes. The tags 26 are attached to the horizontal tubes 23.

[0021] Intentionally formed shafts of the plates 9 are located near the gripping shafts 19 them being attached to the upper end of the shafts 19 with the help of a hinge. Free turning of them downwards, more than in the figure 5, is limited with the help of stoppers. Instead of that they can withdraw upwards by turning around their fastening point. The task of these shafts of the plate 9 is to ensure

that the binding element 8 comes loose from the claws 10 almost immediately when the shafts 19 and the claws 10 are being separated from each other. With this procedure it is ensured that the binding element stays approximately in the middle of the unit in order to make the next possible lift easier.

[0022] The sliding surfaces 21 which get in touch with the horizontal balk 1, belong to the body of the claw box 2, a casing 30 and the stiffeners 25 of the casing belong to the sliding surfaces. The claw box 2 is attached to the transfer bar 20 through the holders 22. The holders 22 and the transfer bar 20 have several optional holes in which case the mutual distance between the claw boxes can be adjusted according to the size of the unit.

Claims

1. Lifting device for goods, like pulp units (7) which are bound with a binding device (8) to which lifting device is belonging at least one horizontal balk (1) which is attached to a crane to which horizontal balk several claw boxes (2) which are moveable in the direction of the mentioned balk are attached in which case each claw box (2) is aimed to grip a binding device (8) for an item to be lifted which binding device is near a claw box when gripping elements (9, 10) which belong to the boxes are brought closer to each other while a binding element (8) stays to be supported by the gripping elements (9, 10), **characterized in that** a moveable, at least a two-piece transfer bar (20) for the claw boxes (2) has been arranged near the horizontal balk (1) and while the transfer bar is being moved, one part of the claw boxes can be moved in the direction of the horizontal balk (1) in relation to the other claw boxes (2) and that end plates (6) belong to the outermost claw boxes (2a, 2b) of the horizontal balk with the help of which the length of a group of items can be reduced by bringing the mentioned end plates (6) closer in relation to each other with the help of the transfer bar (20) while the group of items is between the end plates (6) either freely on a base or being lifted while being supported by the claw boxes.
2. Lifting device for pulp units according to the claim 1, **characterized in that** a hydraulic cylinder (4) is adjusted between the parts of the transfer bar (20) with which hydraulic cylinder the parts and the claw boxes which are attached to them can be brought closer and further away to each other.
3. Lifting device for pulp units according to the claim 1, **characterized in that** the gripping elements (9, 10) are adjusted in such a way that they are flexible upwards and that they can be restored to a lower position.

4. Lifting device for pulp units according to the claim 1, **characterized in that** shafts of the plate (9) are adjusted near the gripping elements (9, 10) which centralize the binding device (8) when they are being removed from gripping claws (10) which shafts of the plate direct the binding device (8) to stay at the central line of the claw box.
5. Lifting device for pulp units according to the claim 1, **characterized in that** several hole separations are adjusted to the transfer bar (20) in order to attach the claw boxes (2) for goods which vary in width.
6. Lifting device for pulp units according to the claim 1, **characterized in that** the distance of the two gripping element pairs (9, 10) of the claw box from each other can be adjusted by for example by arranging a horizontal slide bar attachment (23, 24) for them.
7. Lifting device for pulp units according to the claim 1, **characterized in that** a side guide plate (5) which can be adjusted both in sideways and in relation to its height is arranged to the horizontal balk (1), the aim of which side guide plate is to direct the horizontal balk (1) in the same direction as the group of items.

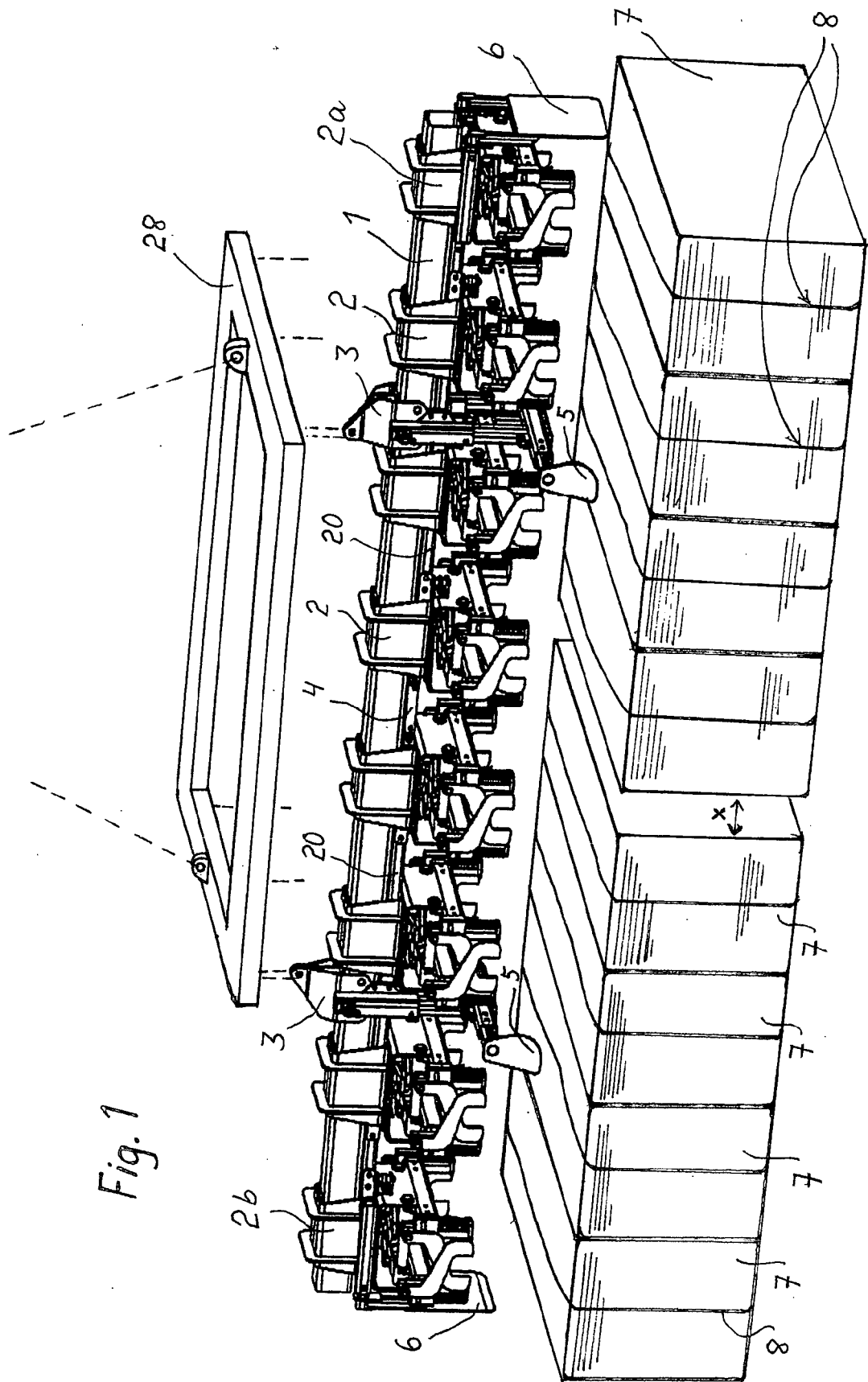


Fig. 1

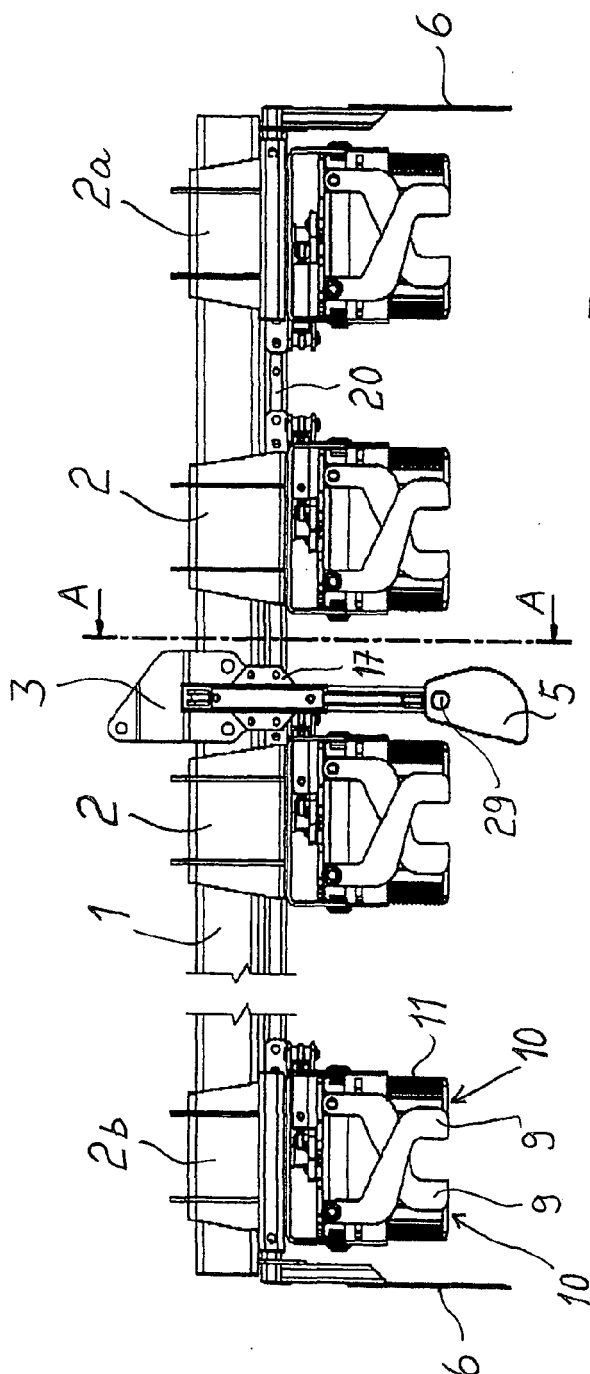


Fig. 2

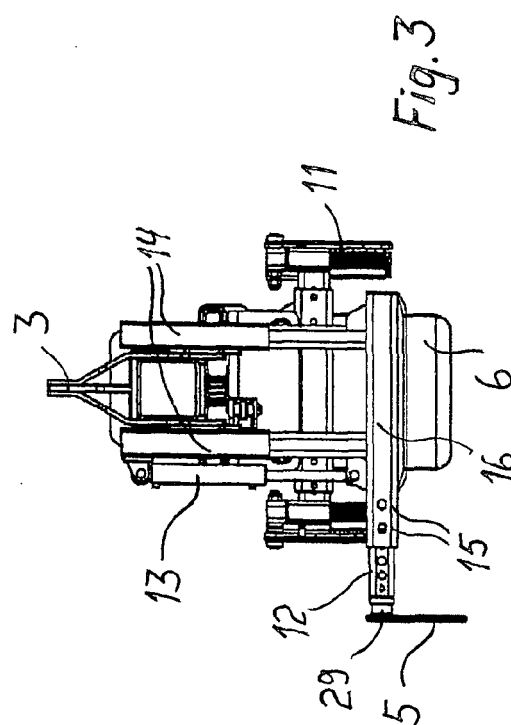
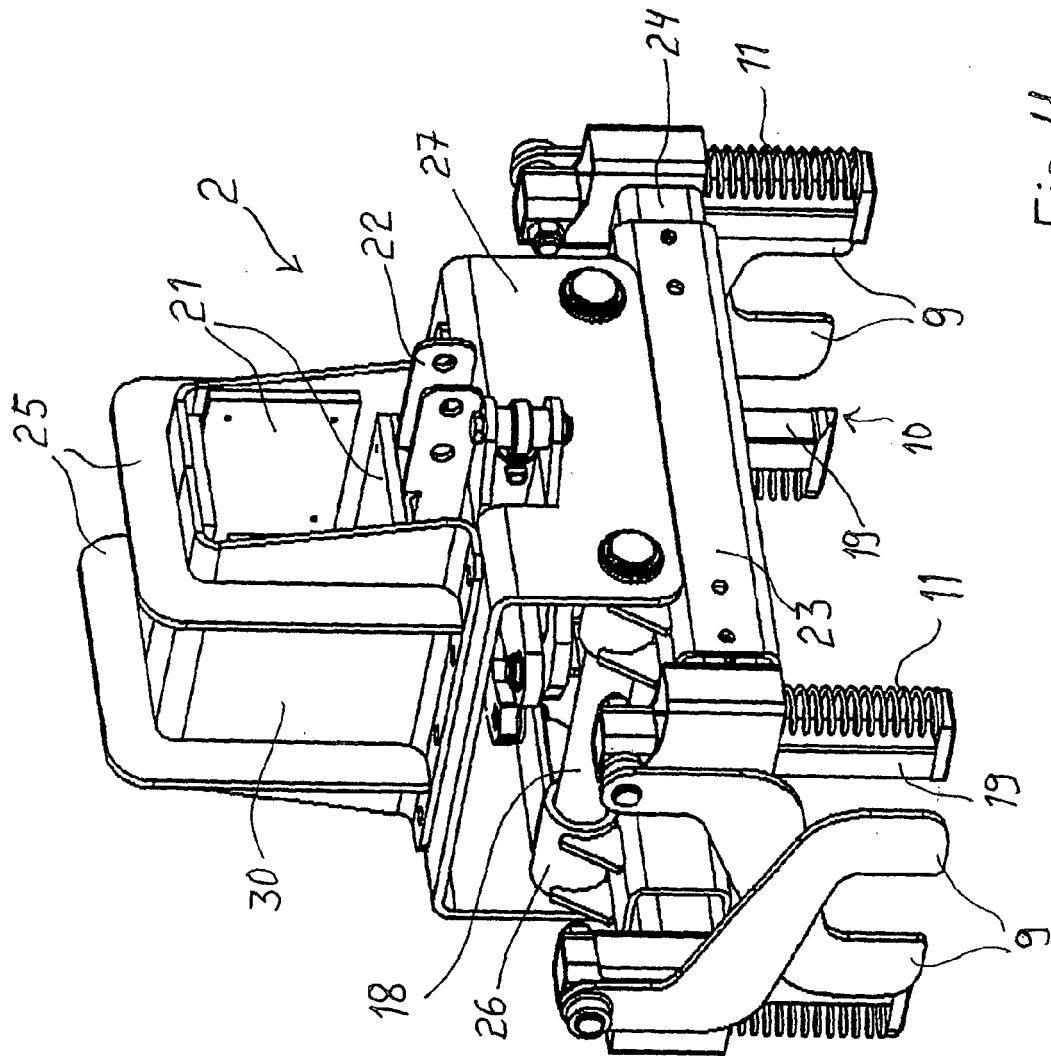


Fig. 3



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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