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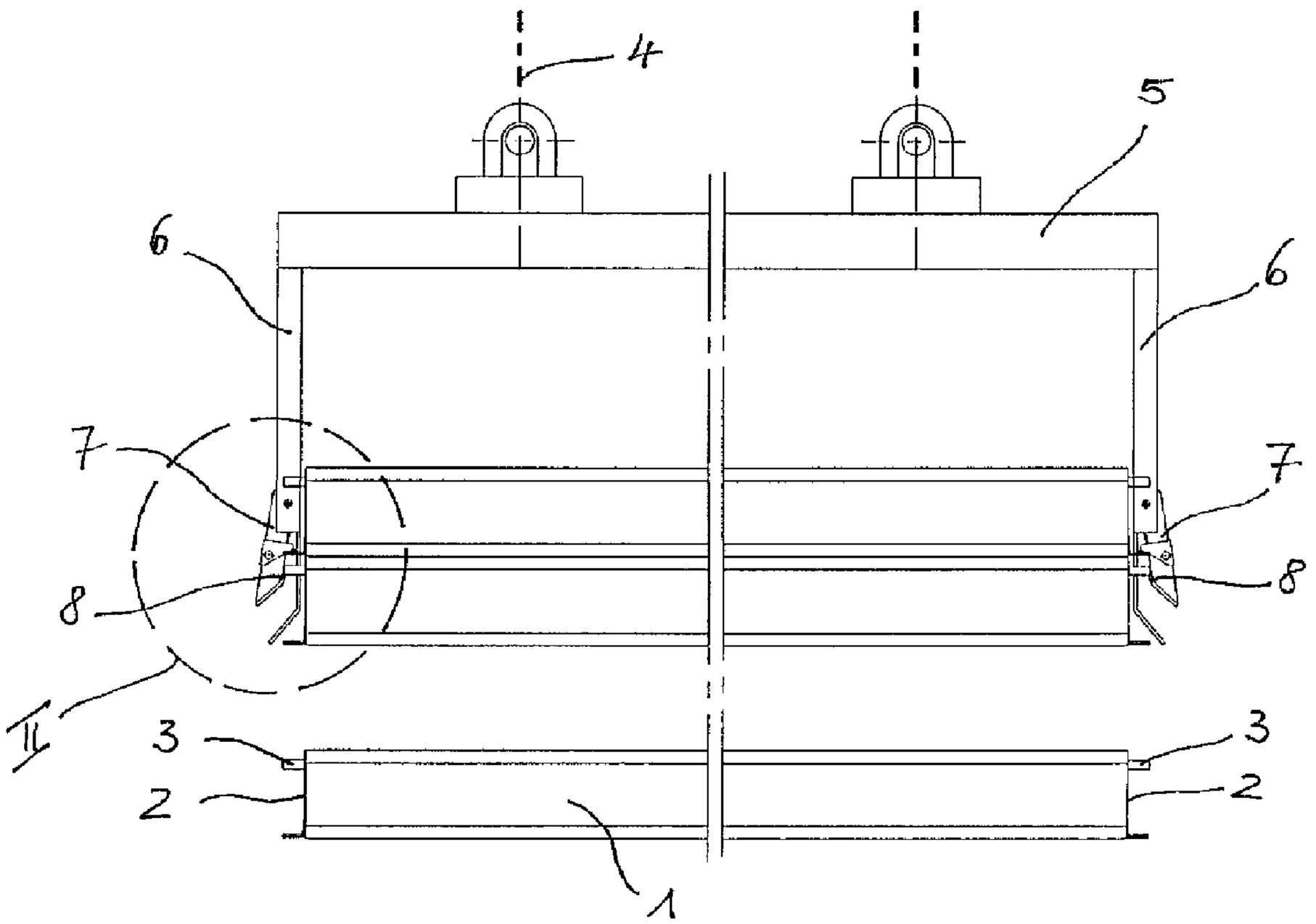
(54) Titre : DISPOSITIF SERVANT A TRANSPORTER DES RECIPIENTS DE MATIERE
(54) Title: TRANSPORTING DEVICE FOR MATERIAL RECEPTACLES



(57) Abrégé/Abstract:
A transporting device is disclosed for receptacles with two oppositely arranged side parts, each side part having a projection for engagement of a load suspension means. Each side part is respectively coordinated with a load arm of a lifting device. The load suspension means are arranged at the lower end of a vertically extending pivoting arm which is hinged at its lower end to the load arm, such that it can pivot about a horizontal axis to adjust the load suspension means between a first position adjacent to the projections and a second position below the projections. Switching components are arranged on the pivoting arms, above the load suspension means, and during upward movement of the load arms, the switching components are moved by the projections around the outside of the projections to cover the load suspension means.

ABSTRACT

A transporting device is disclosed for receptacles with two oppositely arranged side parts, each side part having a projection for engagement of a load suspension means. Each side part is respectively coordinated with a load arm of a lifting device. The load suspension means are arranged at the lower end of a vertically extending pivoting arm which is hinged at its lower end to the load arm, such that it can pivot about a horizontal axis to adjust the load suspension means between a first position adjacent to the projections and a second position below the projections. Switching components are arranged on the pivoting arms, above the load suspension means, and during upward movement of the load arms, the switching components are moved by the projections around the outside of the projections to cover the load suspension means.

Transporting Device for Material Receptacles

A transporting device is known in this connection from the EP 0 770 564 A2. It solves the problem of easily picking up yokes for the automated handling, such that they are stable, with the aid of a lifting device and relates to several yokes, aligned in a plane, as well as several yokes stacked one above the other. In order to activate the load suspension means, however, it is necessary in each case to have corresponding electric, hydraulic or pneumatic adjustment means. This can be tolerated for special cases, but it frequently makes the equipment too expensive and complicated for general use given the variety of receptacles, that is if the adjustment means necessary for the control devices are also taken into account.

It is an object of the present invention to obviate or mitigate the problems associated with conventional receptacle transporting devices.

The invention relates to a device for transporting material receptacles, wherein the receptacles have at least two side parts, positioned substantially vertically on opposite sides, which are provided with respectively at least one projection on the outside for engaging two separate load suspension means, and wherein at least one load arm of a lifting device is assigned to each side part, the load suspension means are arranged on the lower end of a pivoting arm that extends substantially in the vertical direction while the other end of the pivoting arm is positioned such that it can pivot around a horizontal axis, in such a way that it can be adjusted for holding the loads in a horizontal position adjacent to the projections and a position below the projections.

The present invention relates to all different types of receptacles including, e.g., boxes and crates, pallets, skeleton receptacles, case bays or yokes. The only requirement is that the receptacles have at least two side parts arranged on opposite sides. With respect to the materials accommodated by the receptacles, these can include solid bodies in the form of structural components, unit loads, etc., as well as bulk materials. Without limiting the subject-matter of the invention, the materials in question includes, in particular, metal rods, e.g. such as are stored and transported with the aid of bays or yokes, especially in connection with a storage space for rod-shaped material, used to supply separating machines in the form of band saws or circular cold saws for cutting sections from such a rod-shaped material.

It is another object of the invention to redesign a transporting device of the aforementioned type in such a way that it is possible to activate the load suspension means at the location without requiring energy from an external source and the adjustment means operated by this energy. In particular this applies to general or simple

application cases. At the same time, the configuration in this connection is to be simple, robust and operationally safe and should not influence the production costs.

The solution according to the invention is that during a downward movement of the load arms, the load suspension means can be moved with the aid of the projections from a first position, located in the vertical direction within the cross-sectional region of the projections, to a second position that is located outside of this cross-sectional region, that switching components are arranged above the load suspension means on the pivoting arms and that during an upward movement of the load arms, the switching components can be moved by the projections, around the outside of the projections, to a position that covers the load suspension means.

These measures according to the invention have the effect that during the downward movement, the load suspension means are moved to the side by the projections and can thus move around the projections. Once they have passed the projections during the downward movement of the load arms, they drop back into the vertical cross-sectional range of the projections as a result of the effects of gravity. If the load arms are raised once more, they grip the projections from below and in this way can pick up the respective receptacle to be transported.

In order to separate this operational connection between load suspension means and receptacles again, e.g. after the receptacles have been deposited, the load arms are moved farther down with the result that the aforementioned switching components are moved by the projections into a position that covers the load suspension means. If the load arms are raised again, the projections will push the switching components and thus

also the pivoting arms as well as the load suspension means thereon to the side, so that the load suspension means are guided around the projections during their upward movement and thus are released from the projections and the receptacles.

It is obvious that the described mechanism functions automatically on location, so that no adjustment means, which depend on the controlled supply of outside energy, are needed for moving the load suspension means. Otherwise, the device according to the invention has a simple structural principle and, owing to the fact that it has few moving parts, is not sensitive to impairment and thus is operationally safe.

With respect to adjustability, the load suspension means can be oriented substantially vertically or even parallel to the side parts, depending on the spatial conditions in the individual case, in particular the amount of space available for adjusting the load suspension means. In the case where the load suspension means can be adjusted vertically, relative to the side parts, the load suspension means associated with each side part can also be combined to form a correspondingly wider load suspension means, without reducing the tilting safety of the receptacles.

It makes sense if each side part has two projections, arranged side-by-side in a horizontal direction, so that a separate projection is available for each load suspension means. In particular, this ensures a high tilting safety for the receptacles, especially if the receptacles are accelerated positively or negatively during the horizontal movement, owing to the lifting device.

It generally makes sense for all cases to arrange the projections at the same height in order to permit a symmetrical design of the device according to the invention.

It is advantageous if the load suspension means are connected to the pivoting arms via a surface, which is slanted upward in the direction of the associated projections, so that the load suspension means can be more easily pushed to the side by these projections and guided around these projections with a simultaneous, respective pivoting movement of the pivoting arms during the downward movement of the load arms. During the downward movement of the load arms, these slanted surfaces make contact with the projections and slide off the respective edge of the projections. At the end of the sliding surfaces, the load suspension means follow, which are now located outside the vertical cross-sectional region of the projections, following a corresponding movement of the pivoting arms. It is of course understood here that the slanted surfaces are provided with an angle of slope that prevents high frictional forces or the danger of jamming during the above-described movement.

It makes sense for a further modification of the subject-matter to position the switching components on the pivoting arms in such a way that they can rotate around a horizontal axis from a basic position counter to a resetting force. It also makes sense if the switching components can be turned by the projections from the basic position to the side when the load arms move downward even farther and if they can be turned by the projections from the basic position to a position in the opposite direction where they cover the load suspension means during the subsequent upward movement of the load arms.

The switching components, which can have the form of a latch or trip cam, thus are basically kept in a neutral basic position on the pivoting arms by means of

the resetting force. If they make contact from above with the projections during the corresponding downward movement of the load arms, they are moved to the side, counter to the resetting force, so that they can glide along the projections and pass these. Subsequently, they are pivoted back to the basic position by the resetting force and are then positioned below the projections. If the load arms are raised, the switching components make contact from below with the projections and thus are moved in the opposite direction into a position where they are guided in a sliding movement around the projections, so that the pivoting arms and the load suspension means attached to these are guided on the outside around the projections.

In order to secure the last-named position in such a way that the load suspension means cannot collide with the projections, the resetting force effecting the switching components can be provided with a respective value. However, it is advantageous if the switching components are resting against the load suspension means in the position where they cover the load suspension means, meaning they are big enough so that they cover the upper edges of the load suspension means in the direction of the projections and can even project somewhat over them.

When using the option of moving the load suspension means perpendicular to the side parts of the receptacles during the engagement and disengagement with the projections, it may furthermore be useful to arrange the load suspension means associated with each side part on a joint pivoting arm, given a correspondingly parallel arrangement of the rotational axes for the pivoting arms and the switching components, and to arrange the switching components associated with these load suspension means on a joint shaft,

thereby resulting in a particularly simple design. This design would also permit a corresponding actuating of the shaft and thus also the switching components with an additional switching component, e.g. arranged between the projections, so that the first-mentioned switching components would not already have to be pivoted by the projections during the downward movement of the load arms. A certain free space could be won in this way with respect to the design of the first-mentioned switching components. However, an additional switching cam would be required on the respective side part of the receptacle for the additional switching component, so that this solution would be used only for special cases.

The resetting force for the switching components can be generated by springs, which act at least indirectly upon these and which abut against the pivoting arms. In that case, the systems consisting of switching components and springs can be in a state of balance when the switching components are in the basic position. For this, the springs can act in a corresponding manner upon the shafts carrying the switching components.

The projections on the side parts can have an open hollow cross section in the vertical direction and the free ends of the load suspension means that engage in the projections can be provided with an upward pointing nose. With the aid of this nose, the load suspension means subsequently engage in the hollow cross section in the projections when the receptacles are lifted, so that the receptacles are gripped securely against slipping by the load suspension means.

As far as the lifting device is concerned, it can comprise a lifting beam, which moves up and down and extends substantially over the length of the receptacles, between

its side parts. The load arms, which are associated with the side parts and extend downward from the lifting beam in the vertical plane of the associated side parts, can be fastened to the ends of the lifting beam. This type of structural configuration is useful, for example, for picking up box-shaped receptacles, in particular for picking up long pallets, the fronts of which are provided with the projections.

However, if several receptacles are provided, if necessary positioned side-by-side and spaced apart evenly as well as aligned with respect to their side parts, e.g. a number of yokes that can jointly hold a bundle of rod-shaped material, it makes sense if the lifting device has a lifting beam that can be moved up and down and extends over the width of all receptacles. The load arms, which are coordinated with the side parts of the receptacles and extend downward in the vertical plane of the associated projections, are fastened to the sides of the lifting beam.

Any consideration of the subject-matter so far has taken into account only the handling of a receptacle or a row of receptacles arranged in a horizontal plane. However, there are application cases where in particular several identical receptacles are stacked one above the other and where it is desirable to lift and transport two or three receptacles at the same time. In that case, it can be provided that the load arms have a free length above the load suspension means, which bridges at least the height of two receptacles, stacked one above the other. As a result of this, the load arms can be moved downward far enough so that the load suspension means, for example, pass by the projections of two receptacles, stacked one above the other, before they can lift both receptacles by gripping the projections on the lower receptacle from below.

However, the load suspension means in this case can also have several pivoting arms with load suspension means and switching components for the projections of receptacles that are stacked one above the other. This somewhat more complicated solution is recommended in particular if large and heavy receptacles must be handled, since in that case the load can be distributed to a larger number of load suspension means. Finally, it may be advantageous if the distance between load suspension means, arranged one above the other, of a load arm exceeds at least slightly the distance between the projections on superimposed receptacles to avoid imponderables resulting from dimensional tolerances with respect to an even load distribution.

According to an aspect of the present invention there is provided a transporting device for a material receptacle, the material receptacle having two substantially vertical, oppositely arranged side parts, each side part having an outside projection, the transporting device comprising a lifting device, load arms provided on the lifting device, pivoting arms pivotally attached to the load arms, load suspension means provided on the pivoting arms, the load suspension means for engagement with the corresponding projections, switching components provided on the pivoting arms, each switching component moveable between a disengaged position in which the switching component exposes the corresponding load suspension means enabling the load suspension means to engage the corresponding projection and an engaged position in which the switching component covers the corresponding load suspension means preventing the load suspension means from engaging the corresponding projection, and wherein during a downward movement of the load arms, the pivot arms are pivoted from a first position in which the load suspension means are adjacent to the corresponding projections and disengaged therefrom to a second position in which the load suspension means are below the projections and in which the load suspension means can engage the projections for lifting of the material receptacle, and wherein during an upward movement of the load arms, the switching components are moved by the projections to the engaged positions.

Additional features and details that describe the invention follow from the subsequent description of an embodiment, which is shown in the drawings in which:

Figure 1 is the view from the side of a stack of superimposed receptacles, together with the transporting device according to the invention;

Figure 2 is an enlarged detail of a segment of the region II in Figure 1;

Figure 3 is a frontal view of the subject-matter according to Figure 2;

Figure 4 is an enlarged view of the load suspension means according to Figure 2;

Figure 5 is an enlarged view of this load suspension means according to Figure 3 and;

Figures 6 to 21 illustrate the operational mode of the load suspension means illustrated in Figures 2 and 3.

Figure 1 shows a stack of receptacles such as pallets, arranged one above the other, in the form of elongated boxes 1 for accommodating material, e.g. in the form of metal rods. On their fronts 2, these boxes 1 have oppositely arranged side parts, which are provided with horizontal projections 3 for gripping and transporting the boxes.

A lifting beam 5 is used for this, e.g. stopped by the ropes 4 at a position not shown here, with load arms 6 on its ends, which extend vertically downward and have pivoting arms 7 with hook-shaped load suspension means 8 on the ends for engaging the projections 3. Figure 1 shows that the load arms 6 are designed to be long enough to extend over several pallets 1 in the vertical direction, so that even a stack of superimposed boxes can be lifted and transported by making use of the projections on the lowest box.

For a more detailed explanation of the load suspension means, Figure 2 shows an enlarged representation of the partial section II in Figure 1, and Figure 3 shows the front of the subject-matter of Figure 2. It can be seen therein that the side parts 2 are extended sword-like past the height of pallets 1 and end on the other side in a corresponding manner with their lower edge 9 above the lower edge 10 of box 1, so that superimposed boxes 1 are secured form-locking against a slipping. Figures 2 and 3 show that the projections 3 form an open hollow cross-sectional space in the vertical direction, into which the hook-shaped load suspension means 8 can also engage in a form-locking manner.

Together with their enlarged partial views in Figures 4 and 5, the Figures 2 and 3 illustrate that the load suspension means 8 are positioned on the lower end of the pivoting

arms 7, wherein the pivoting arms 7 are positioned such that they can pivot via a shaft 11on the load arms 6 and are suspended vertically downward from these, in such a way that the load suspension means 8 are located in the vertical cross-sectional region above the projections 3.

A pair of latch-type switching components 13 is positioned on the pivoting arms 7, above the load suspension means 8, such that they can pivot via a shaft 12 that is parallel to shaft 11, wherein each switching component 13 is coordinated with a load suspension means 8. The switching components 13 normally are in the basic position illustrated in Figures 2 to 5. They are held in this position by a resetting force in the form of a spring 14 that abuts at point 15 on the pivoting arm 7 and acts at point 16 upon the shaft 12, wherein the contact point 16 for the aforementioned basic position is the surface region of shaft 12 that is closest to the point 15.

Figures 2 to 5 show that each side part 2 of the box 1 has two projections 3, arranged at a distance to each other, so that the box 1 can be picked up without tilting, however, in an alternative embodiment each side part 2 has one projection 3. Respectively one load suspension means 8 is coordinated with these projections, wherein the load suspension means 8 that are coordinated with a side part 2 are attached to a joint pivoting arm 7, in that the pivoting arm 7 has a horizontally extending slanted surface 17 on the lower end, from which the load suspension means 8 project upward, in the direction of the switching components 13.

The load arms 6 are also provided on their lower end with slanted surfaces 18, which point away from the side parts 2. Together with the sword-shaped extensions of

side parts 2, these slanted surfaces facilitate the placement of the load arms 6 along the side parts 2, such that they are aligned.

Starting from the shaft 12, which should be at the highest possible distance to the load arms 6, the switching components 13 extend substantially in the direction toward the load arms 6 and are far enough so that during the pivoting in the direction of load suspension means 8, which is to be shown later, they come to rest counter to the effect of the resetting force of spring 14 from above against the load suspension means 8, thus covering these from above. An upward directed slanted surface is formed by the upper edge 19 of each switching component 13, which is directed away from the load suspension means 8 and the load arms 6. The function of this surface is also made clear in the following description, which explains the operation of the device described so far with the aid of Figures 6 to 21.

In Figures 6 and 7, the load arms 6 are on a downward movement, wherein the gliding surfaces 17 that carry the load suspension means 8 have made contact from above with the projections 3 and slid along these, so that the pivoting arms 7 are pivoted about shaft 11 on the load arms 6 and away from the side parts 2 of pallets 1. As a result of this, the load suspension means 8 can move around the projections 3, until they are below the projections 3, as shown in Figures 8 and 9. Since the load suspension means 8 in this case are free of the projections 3, the pivoting arms 7 can move back to their original position of being suspended downward, with the load suspension means 8 being below the projections 3.

During a subsequent upward movement of load arms 6, shown in Figures 10 and 11, the load suspension means 8 can slide from below into the hollow cross-sectional spaces of projections 3, which are open in the vertical direction, thereby making it possible to lift the respective box 1 with the aid of the lifting device by lifting the lifting beam 5.

In order to separate the described interlocking connection once more, the load arms 6 are moved farther downward in the manner shown in Figures 12 and 13. In the process, the switching components 13 are pivoted by the projections 3 from the basic position, about the axis represented by shaft 12, and counter to the resetting position of spring 14, so that they pass the projections 3.

Once the switching components 13 have passed the projections 3 during the described movement in downward direction, they return to the basic position as a result of the effect of spring 14, in the manner illustrated in Figure 14. If the load arms 6 are subsequently moved upward again, as shown in Figure 15, the switching components 13 move from below against the projections 3 and are pivoted with their free ends in the opposite direction, counter to the resetting force of spring 14, in the direction of the load suspension means 8, against which they finally come to rest as shown in Figures 16 and 17. In this case, the edge 19 of switching components 13 forms a slanted surface, which extends continuously upward from the load suspension means 8 and the load arms 6.

During a further upward movement of load arms 6, this slanted surfaced glides along the bottom edge of the projections 3, as a result of which the pivoting arms 7 and thus also the load suspension means 8 are pivoted away from the load arms 6, so that the load

suspension means 8 can move on the outside around the projections 3. This is shown by sequential steps in Figures 18 to 21.

During the further course of the movement, which is not shown, the load arms 6 are lifted upward and clears the box 1. The box is consequently deposited at the desired location. As can be seen, the described device makes it possible to pick up, transport and redeposit the receptacles, simply by moving the lifting device and without requiring adjustment means that need outside energy. In this case, several receptacles, stacked one above the other, can be transported simultaneously in the manner shown in Figure 1.

The load suspension means for the herein described embodiment can be moved by pivoting them and moving them around the projections, perpendicular to the side parts 2. Of course, the same result can be achieved by moving the load suspension means parallel to the side parts 2. However, normally this requires a separate pivoting arm with thereon positioned switching component for each load suspension means.

The foregoing description of the preferred embodiments of the present invention has been presented for the purposes of illustration and description. It is not intended to be exhaustive or to limit the application. Many modifications, variations and adaptations are possible without departing from the scope of the invention as defined in the claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A transporting device for a material receptacle, the material receptacle having two substantially vertical, oppositely arranged side parts, each side part having an outside projection, the transporting device comprising:

a lifting device;

load arms provided on the lifting device;

pivoting arms pivotally attached to the load arms;

load suspension means provided on the pivoting arms, the load suspension means for engagement with the corresponding projections;

switching components provided on the pivoting arms, each switching component moveable between a disengaged position in which the switching component exposes the corresponding load suspension means enabling the load suspension means to engage the corresponding projection and an engaged position in which the switching component covers the corresponding load suspension means preventing the load suspension means from engaging the corresponding projection, and

wherein during a downward movement of the load arms, the pivot arms are pivoted from a first position in which the load suspension means are adjacent to the corresponding projections and disengaged therefrom to a second position in which the load suspension means are below the projections and in which the load suspension means can engage the projections for lifting of the material receptacle, and

wherein during an upward movement of the load arms, the switching components are moved by the projections to the engaged positions.

2. The transporting device according to claim 1, wherein the load suspension means can be adjusted to be substantially perpendicular to the side parts.

3. The transporting device according to claim 1 or 2, wherein the load suspension means associated with each side part are combined to form a correspondingly wide load suspension means.

4. The transporting device according to claim 1, wherein the load suspension means can be adjusted to be substantially parallel to the side parts.

5. The transporting device according to any one of claims 1 to 4, wherein each side part has two projections that are arranged side-by-side in a horizontal direction.

6. The transporting device according to any one of claims 1 to 5, wherein the projections are arranged at the same height level.

7. The transporting device according to any one of claims 1 to 6, wherein the load suspension means are connected to the pivoting arm via an upward pointing slanted surface, which is slanted in the direction of the coordinated projections.

8. The transporting device according to any one of claims 1 to 7, wherein the switching components are positioned on the pivoting arms such that they can pivot from a basic position around a horizontal axis and counter to a resetting force, and that the switching components can be turned to the side from the basic position by the projections during a further downward movement of the load arms and during a subsequent upward movement of the load arms can be turned by the projections from the basic position in the opposite direction to the position where the load suspension means are covered.

9. The transporting device according to claim 8, wherein the switching components rest on the load suspension means while in the position where they cover the load suspension means.

10. The transporting device according to any one of claims 1 to 9, wherein axes of rotation for the pivoting arms and switching components are arranged parallel to the side parts, the load suspension means coordinated with each side part are arranged on a joint pivoting arm and the switching components that are coordinated with these load suspension means are arranged on a joint shaft.

11. The transporting device according to any one of claims 1 to 10, wherein the resetting force for the switching components is generated by springs, which act at least indirectly upon these switching components and abut against the pivoting arms, and wherein the system comprising of switching components and springs is in a balanced state if the switching components are in the basic position.

12. The transporting device according to claim 11, wherein the springs act upon the shafts that carry the switching components.

13. The transporting device according to any one of claims 1 to 12, wherein the projections of the side parts have a hollow cross section that is open in a vertical direction.

14. The transporting device according to any one of claims 1 to 13, wherein free ends of load suspension means that engage into the projections are provided with an upward projecting nose.

15. The transporting device according to any one of claims 1 to 14, wherein the lifting device is provided with a lifting beam that extends substantially over the length of the receptacles and can be moved up and down, and wherein the load arms extended downwardly from the lifting beam in the vertical plane of the coordinated side part, are attached to ends of the lifting beam.

16. The transporting device according to any one of claims 1 to 14, wherein the material receptacle comprises several receptacles with their side parts aligned and wherein the lifting device is provided with a lifting beam that extends over the width of all the receptacles and can be moved up and down, and the load arms extend downwardly and extend from the lifting beam downward in the vertical plane of the projections, are attached to the sides of the lifting beam.

17. The transporting device according to any one of claims 1 to 16, wherein the load arms have a free length above the load suspension means, which bridges the height of at least two receptacles, stacked one above the other.

18. The transporting device according to any one of claims 1 to 17, wherein the load arms have several superimposed pivoting arms with load suspension means and switching components for the projections of receptacles, which are stacked one above the other.

19. The transporting device according to any one of claims 1 to 18, wherein the distance between superimposed load suspension means on the load arms is longer than the distance between the projections on the receptacles, which are stacked one above the other.

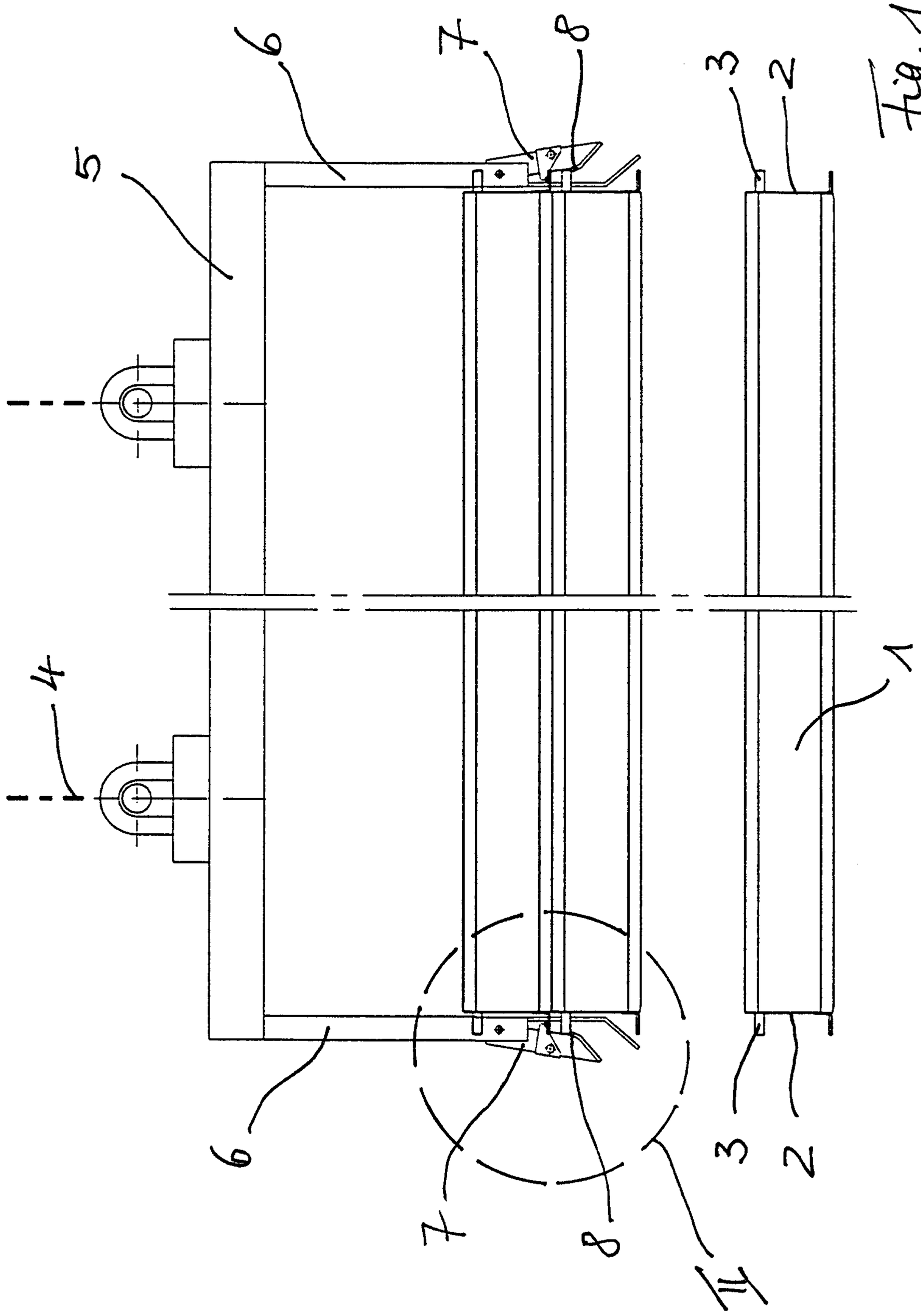


Fig. 1

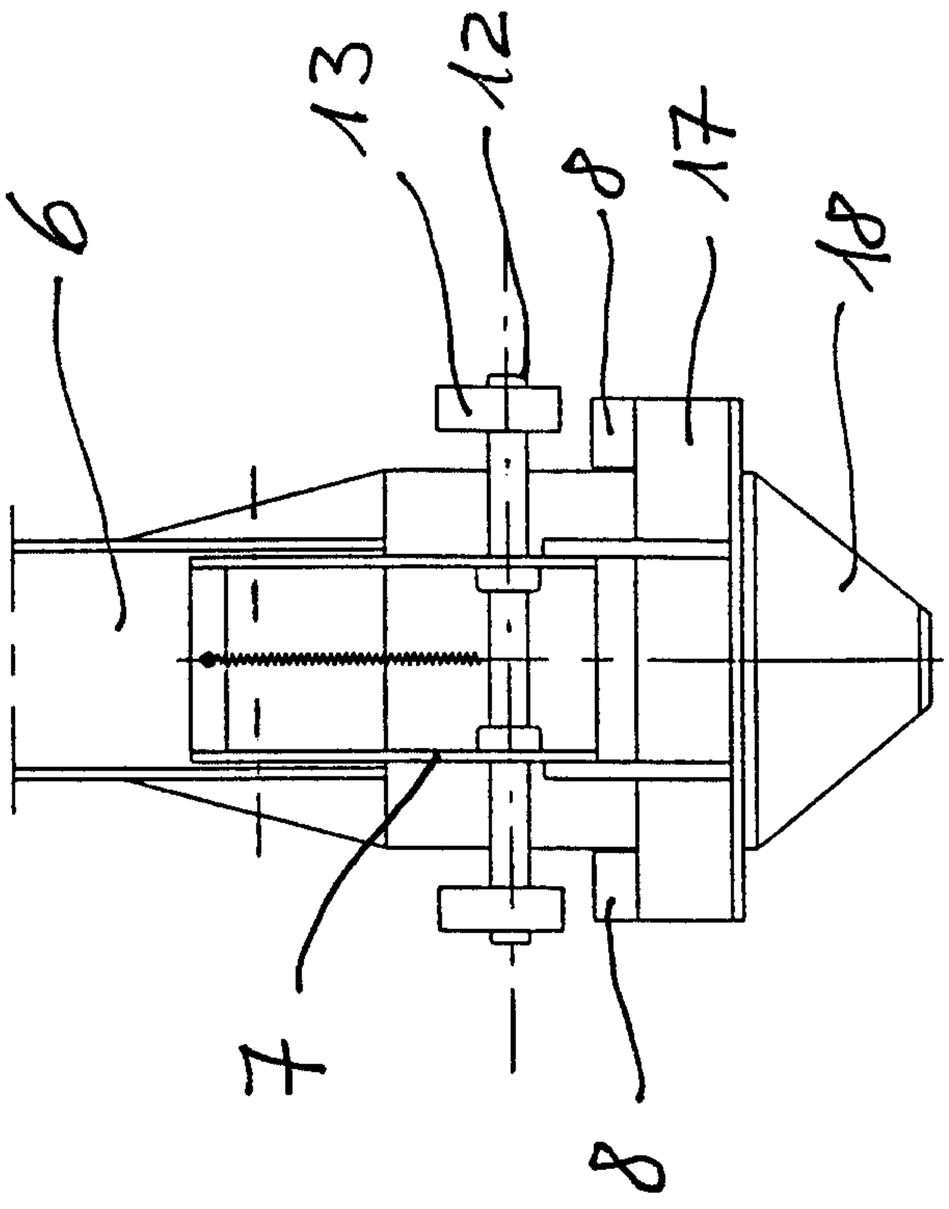


Fig. 3

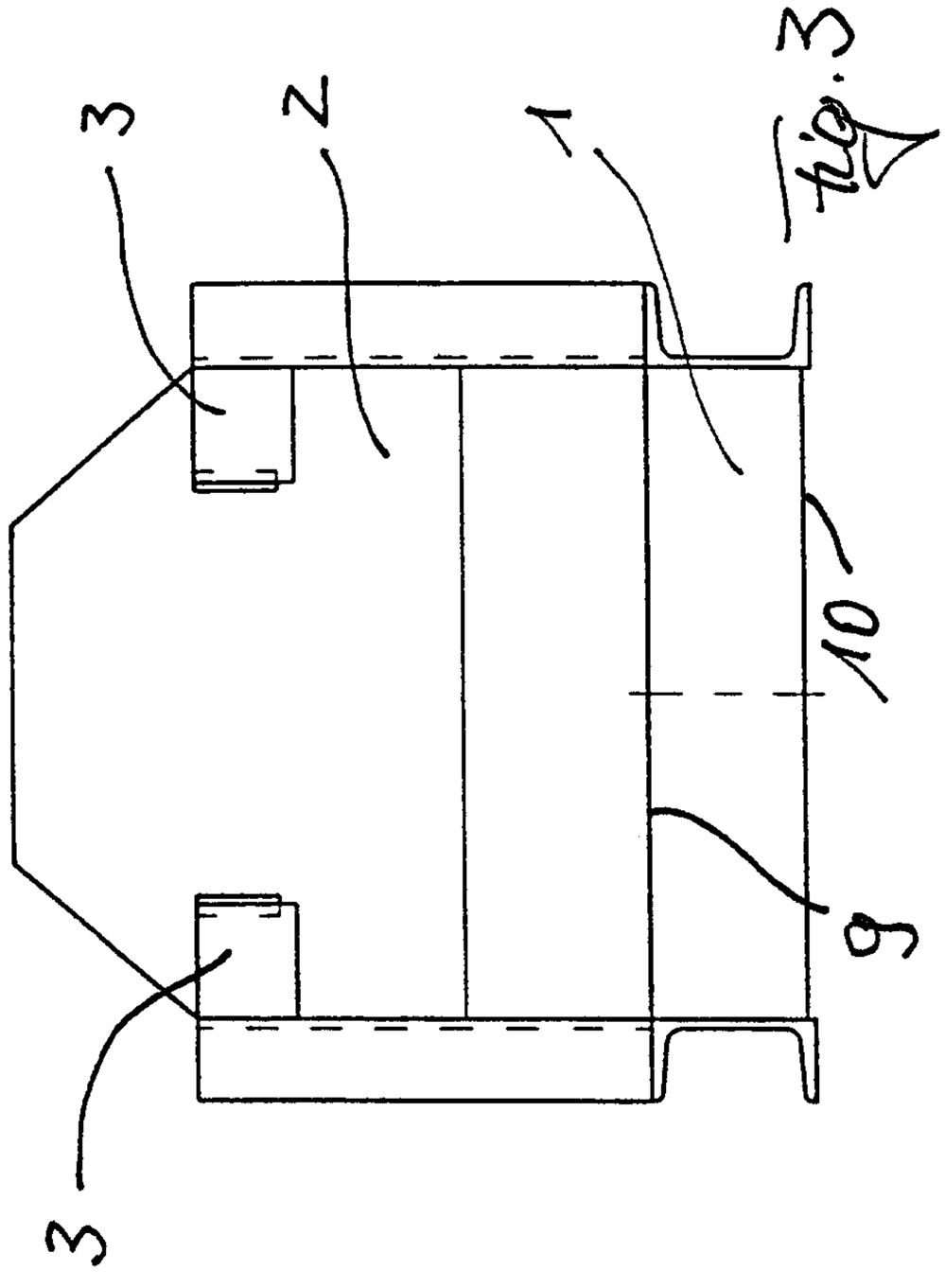
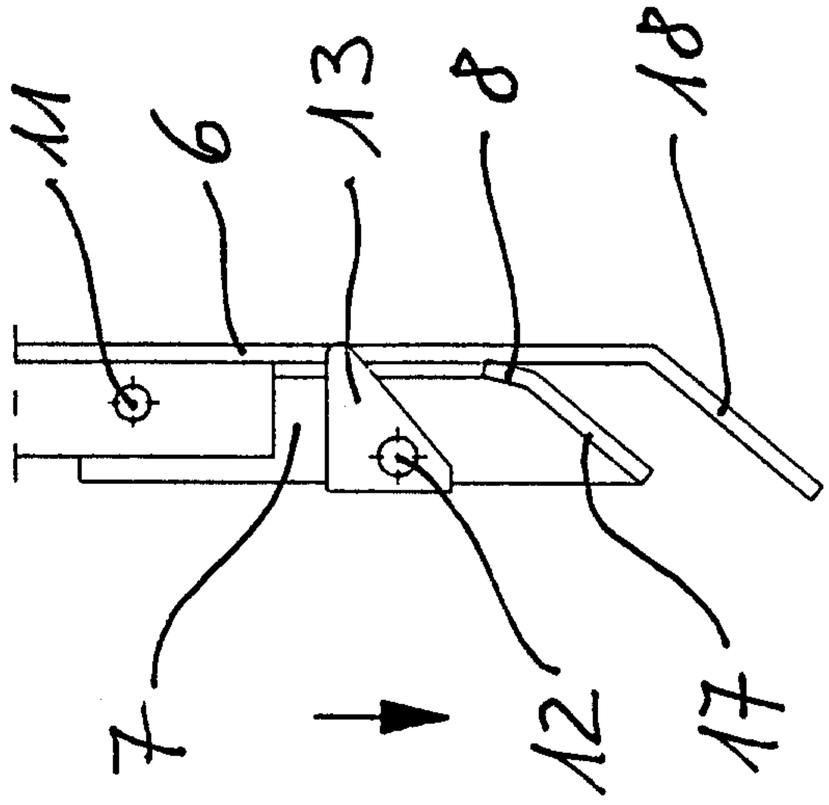
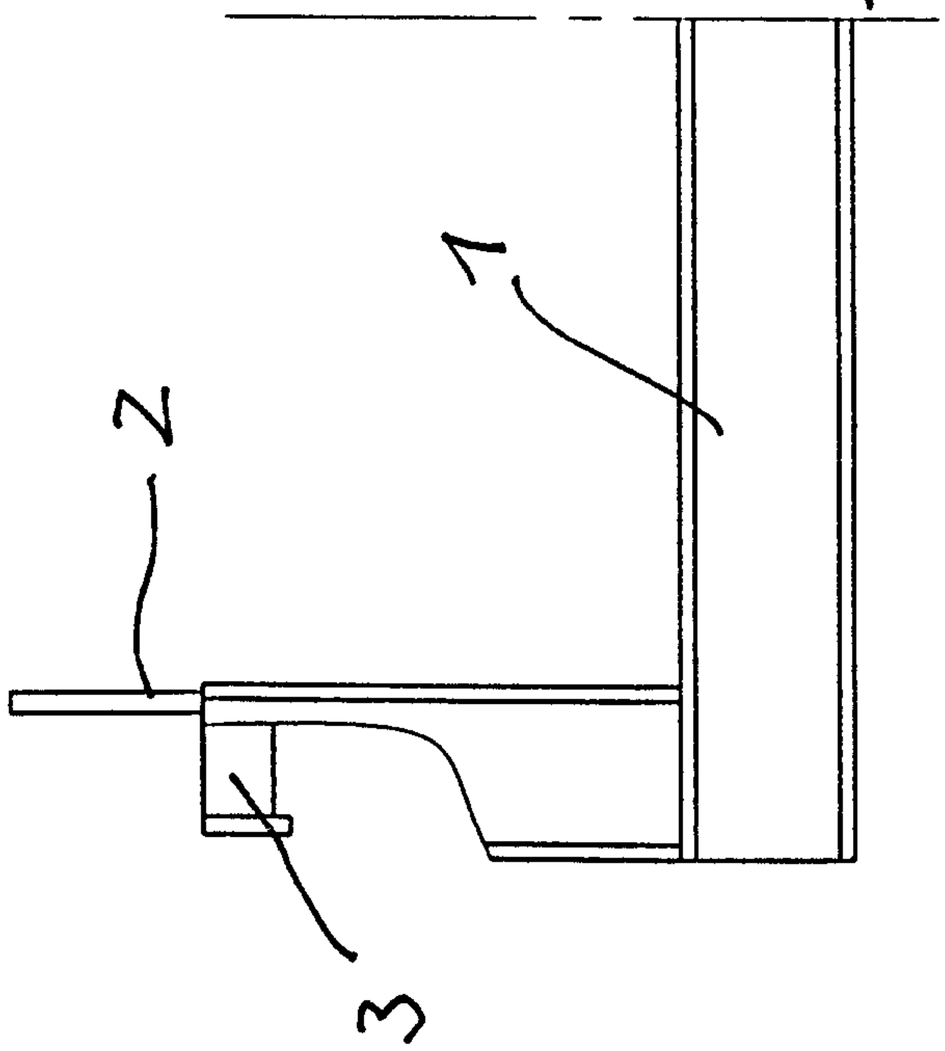


Fig. 2





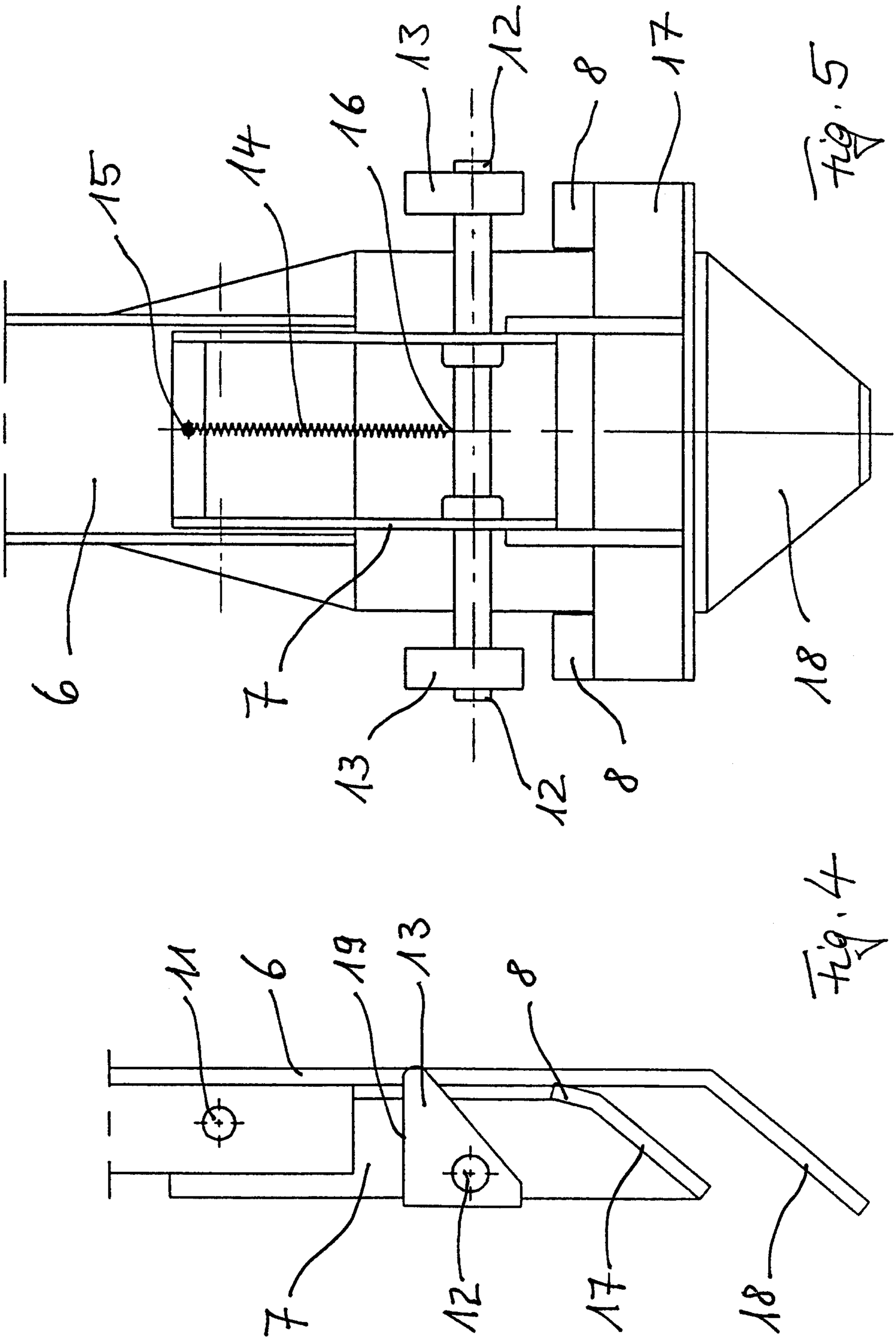


Fig. 5

Fig. 4

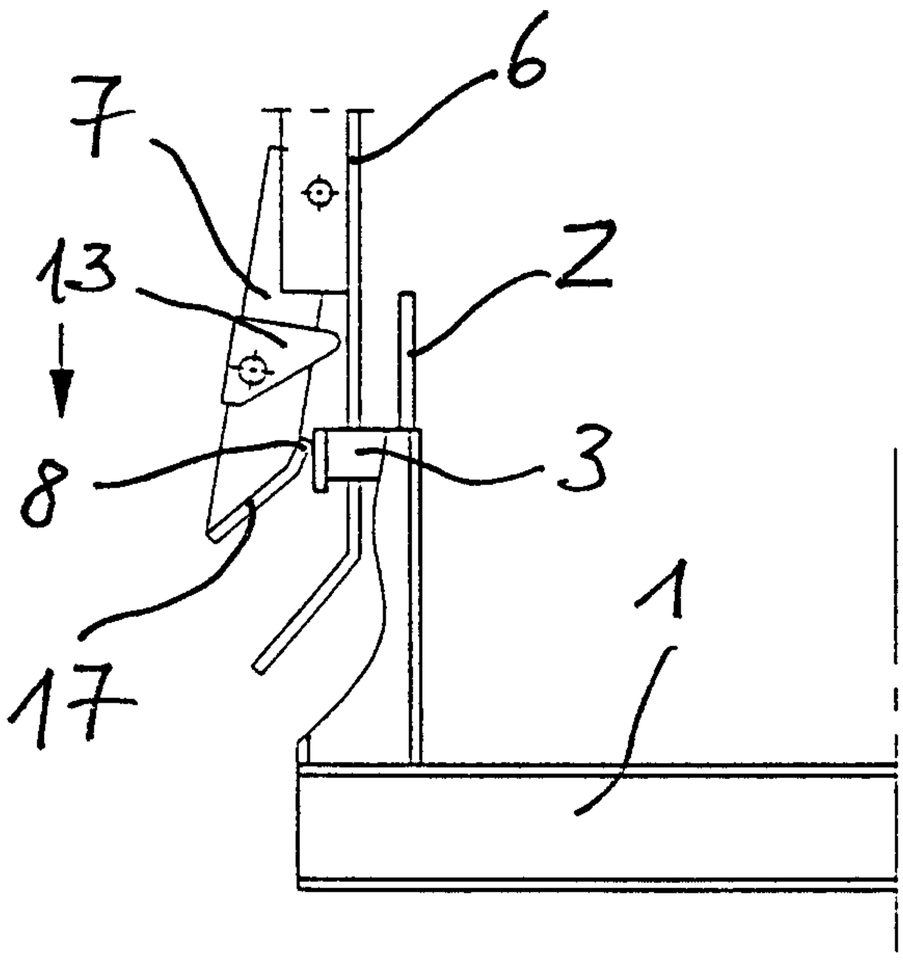


Fig. 6

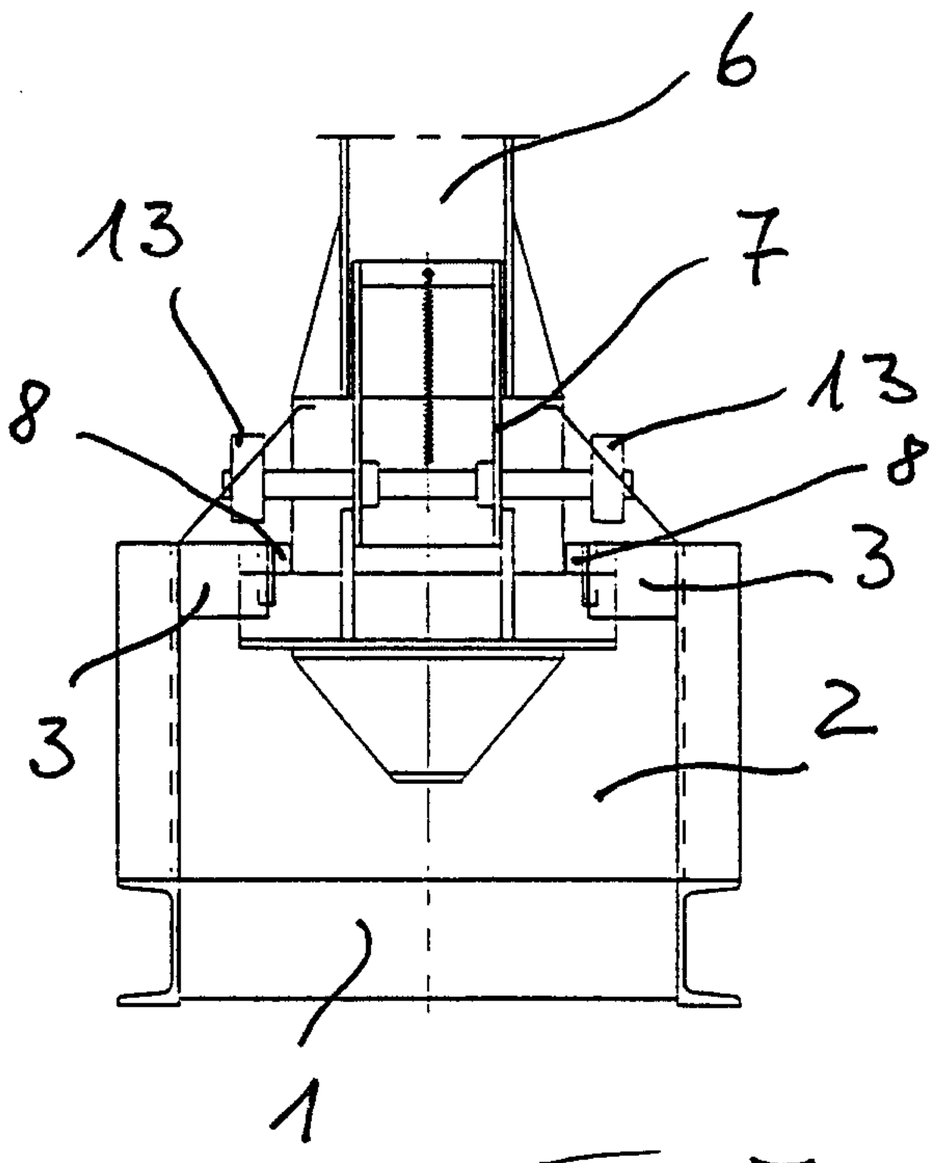


Fig. 7

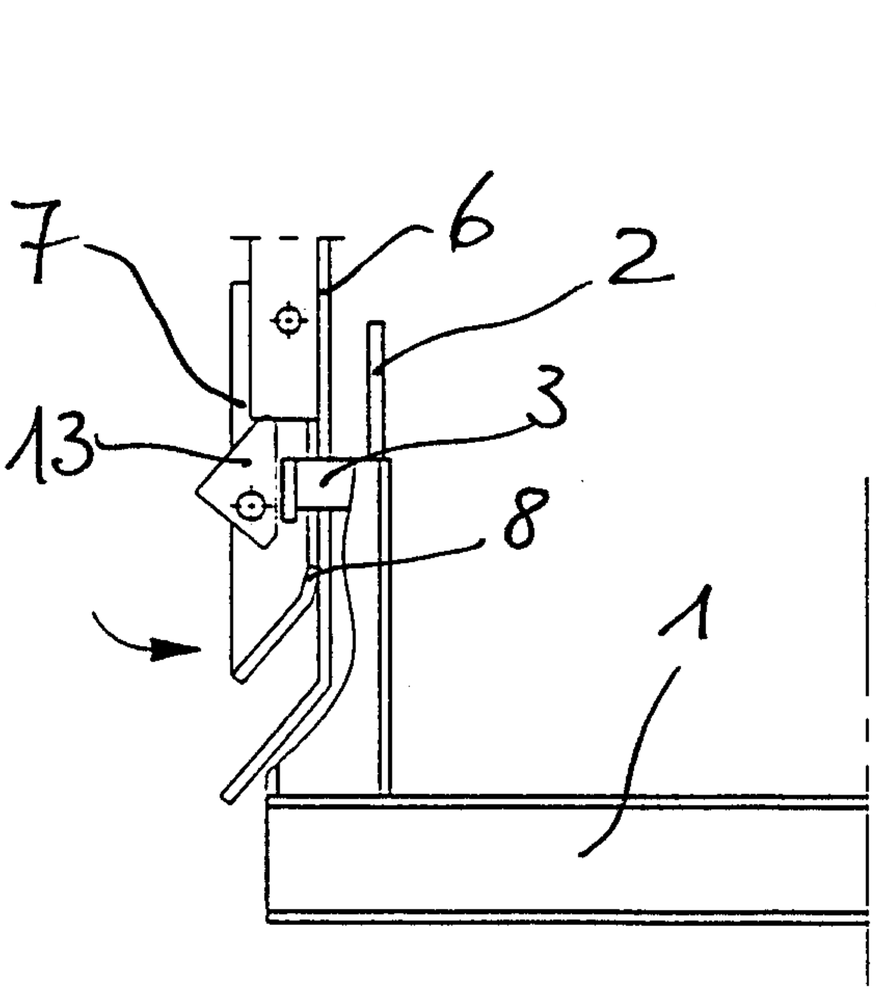


Fig. 8

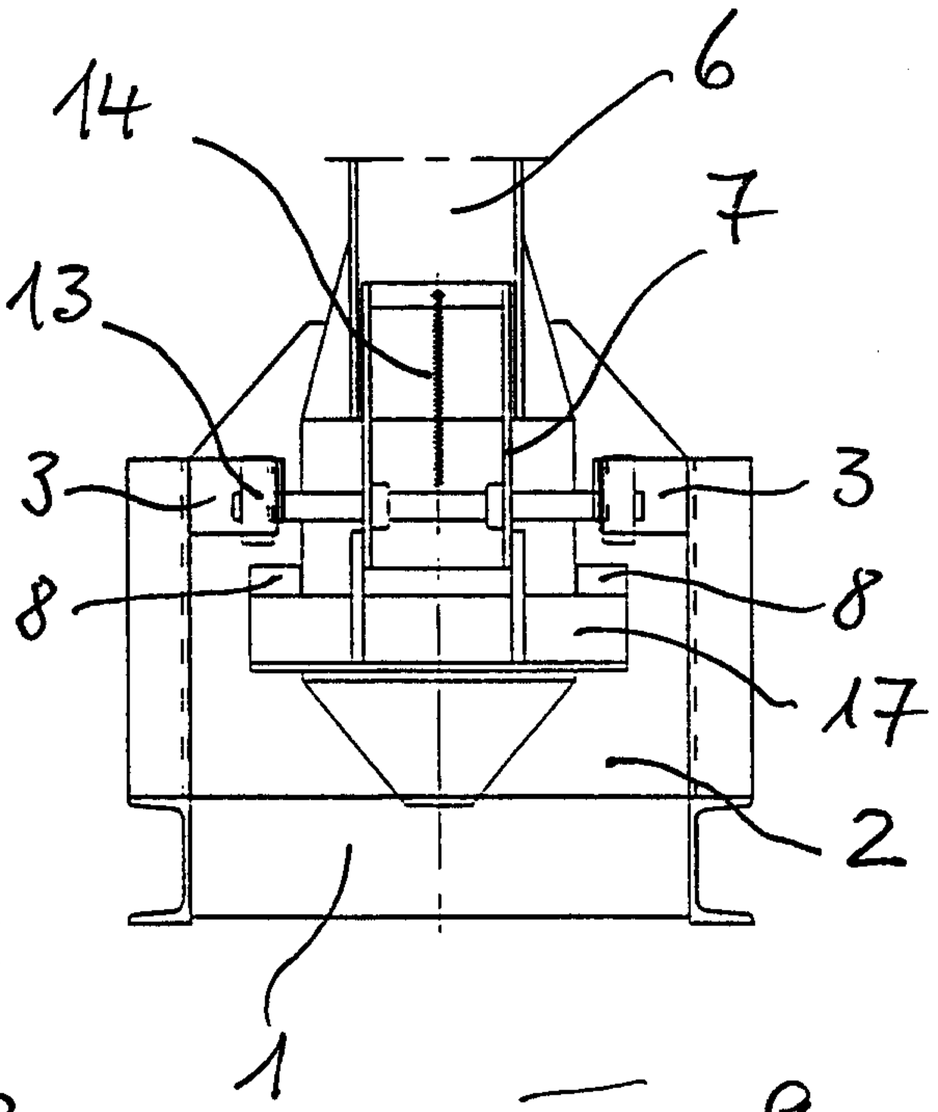


Fig. 9

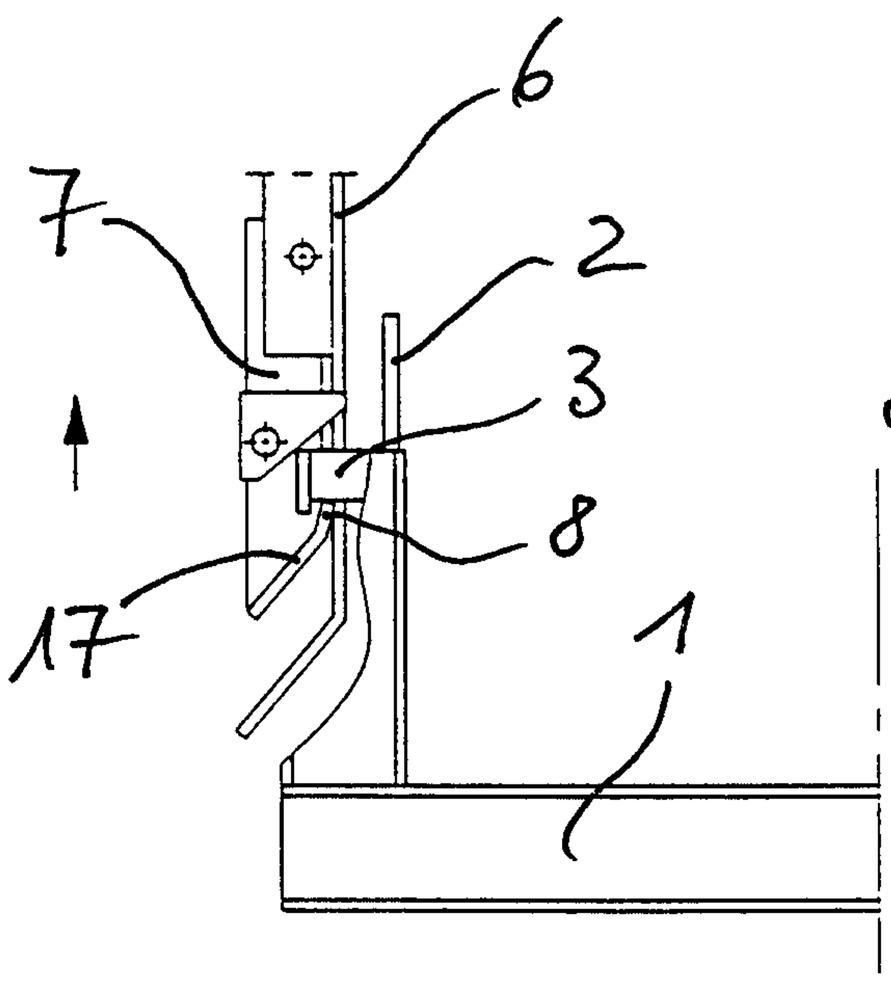


Fig. 10

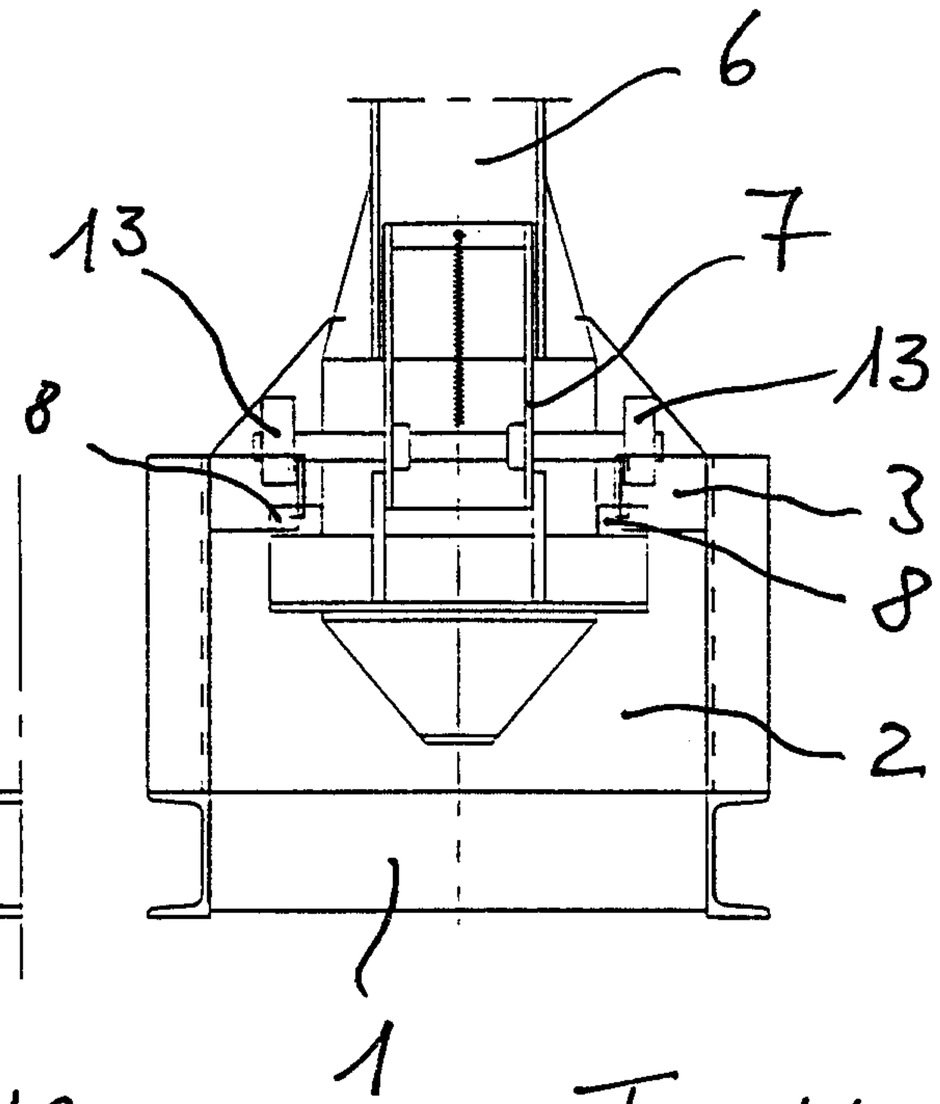


Fig. 11

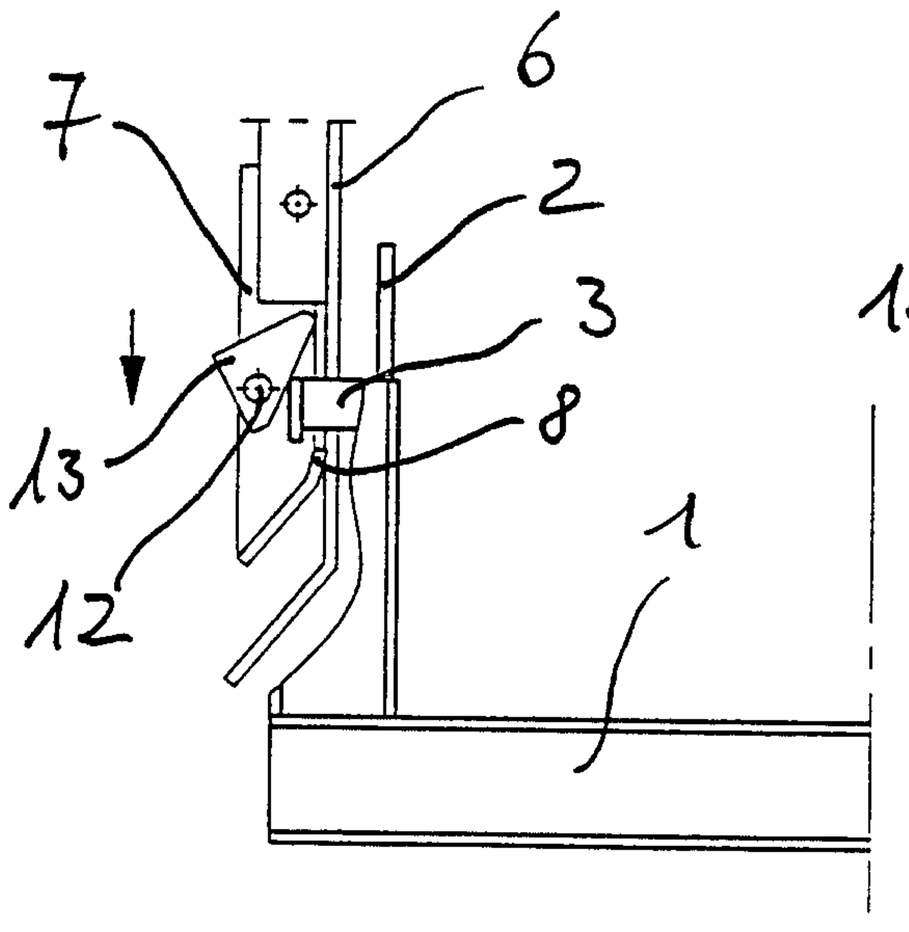


Fig. 12

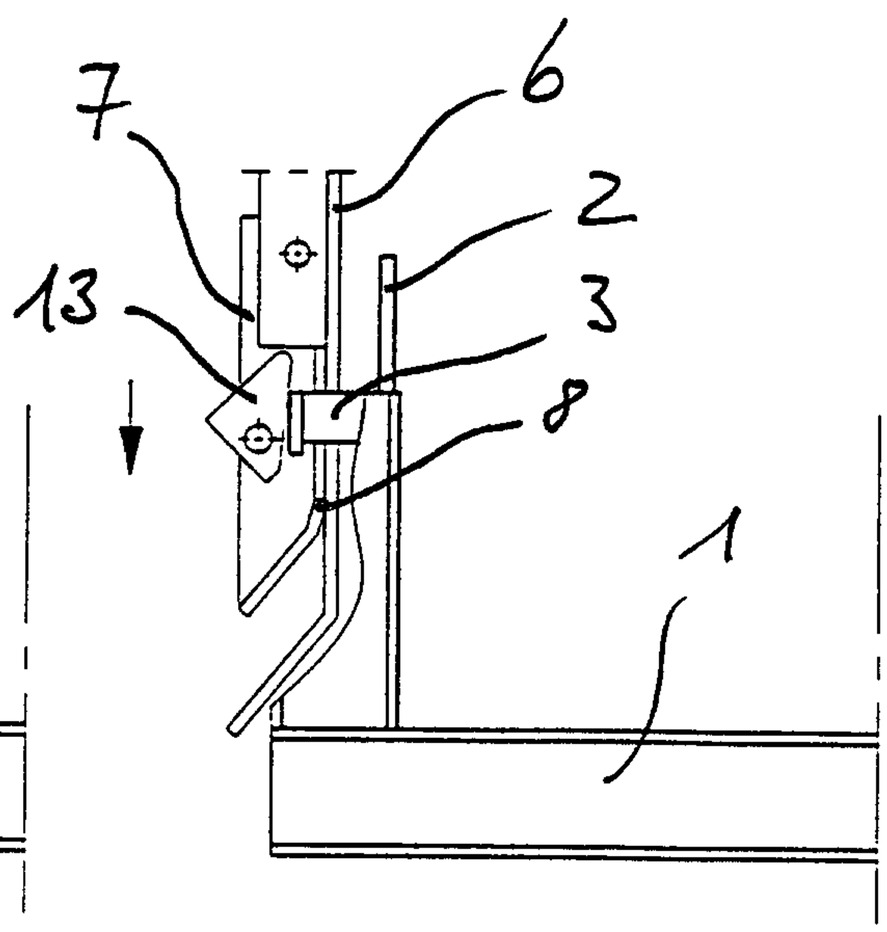


Fig. 13

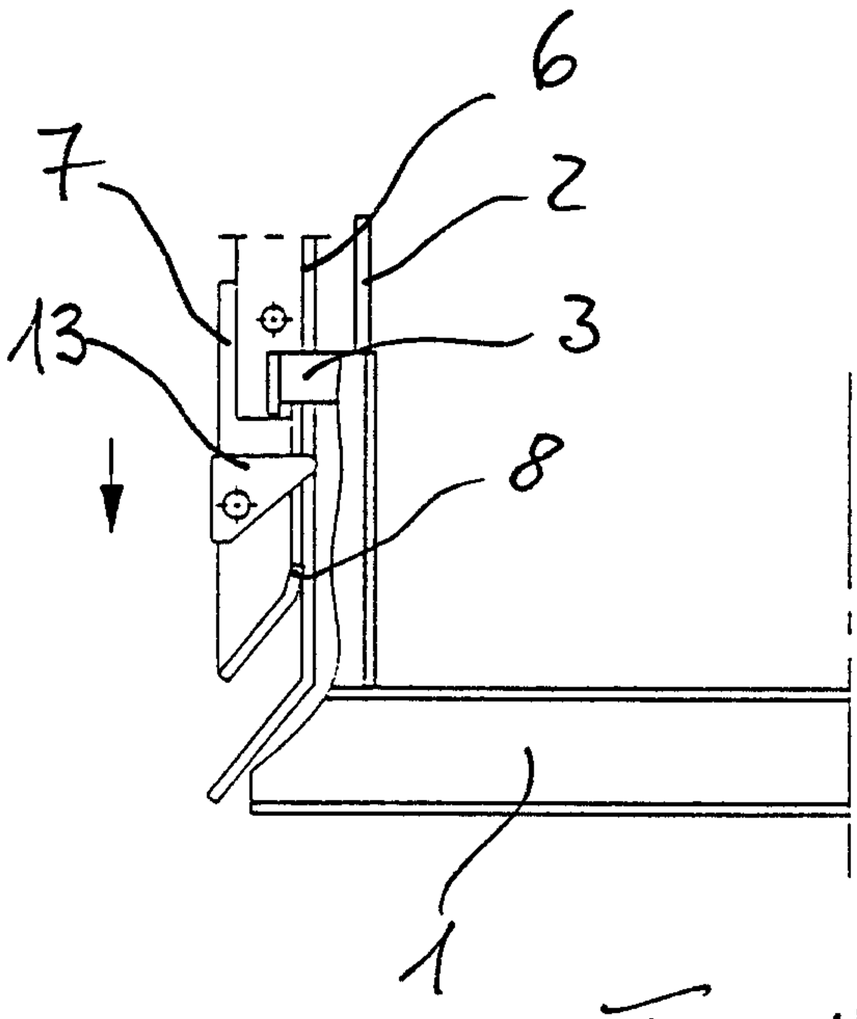


Fig. 14

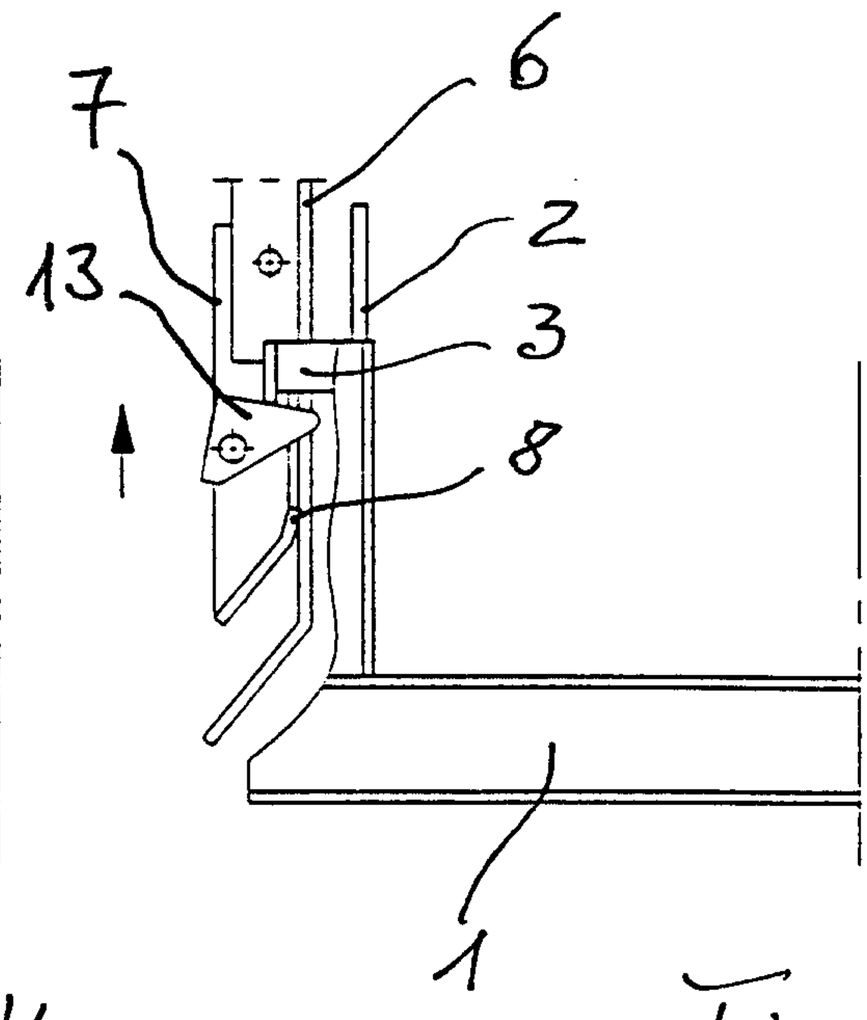


Fig. 15

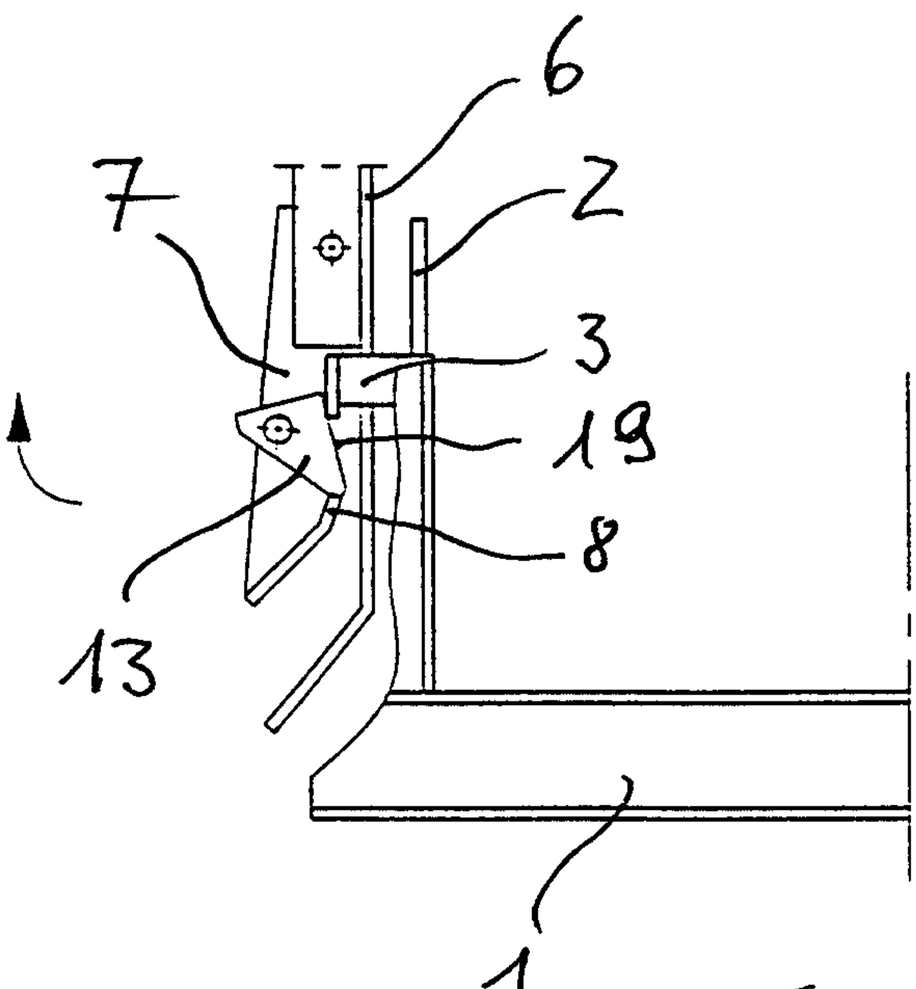


Fig. 16

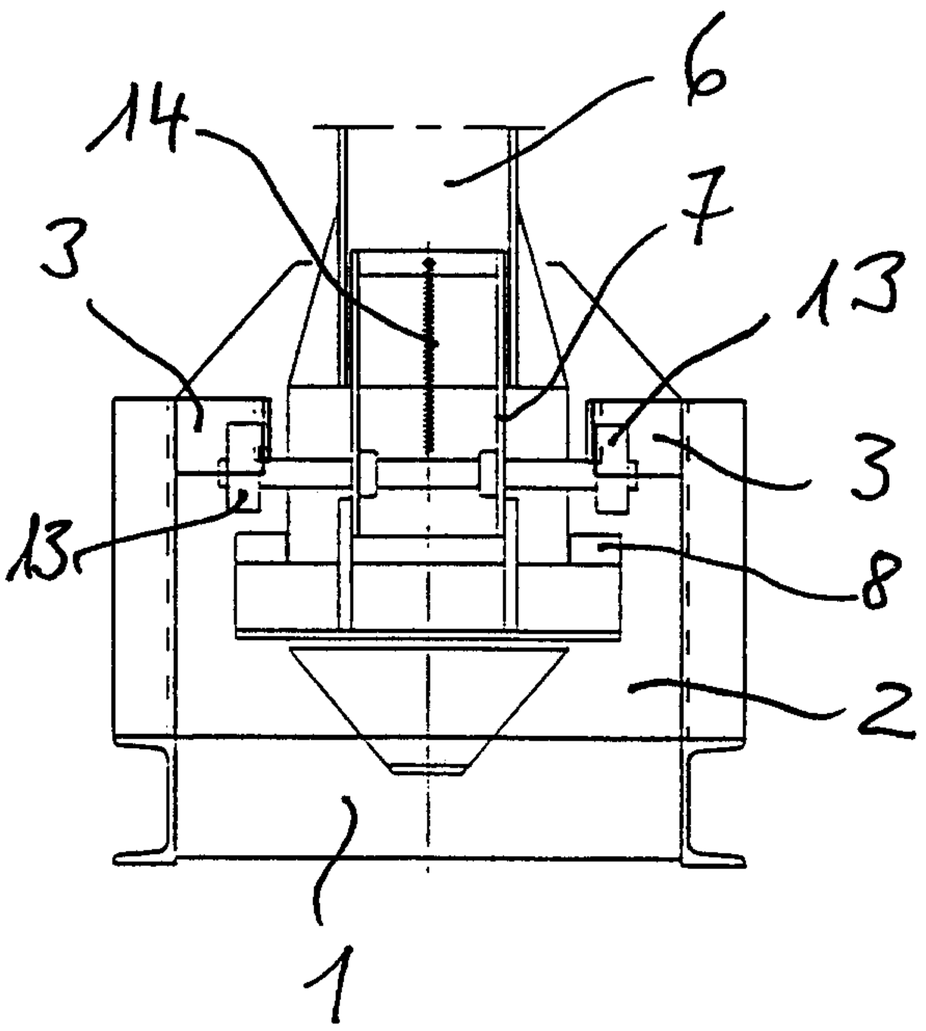


Fig. 17

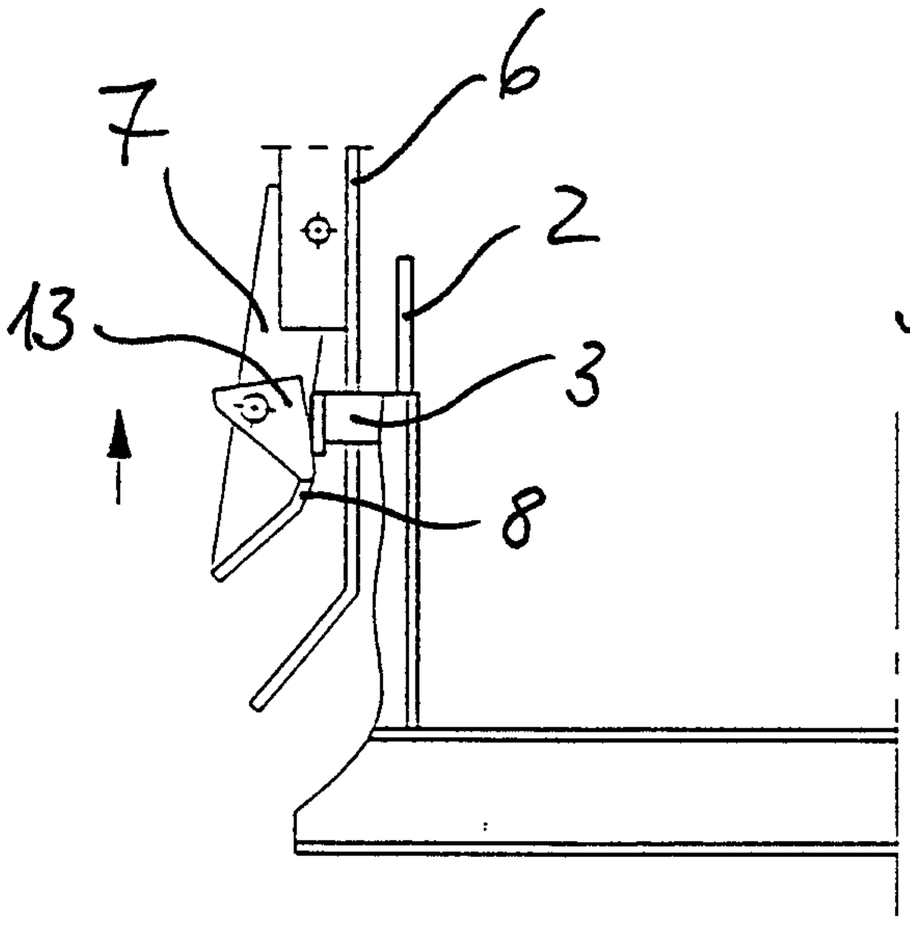


Fig. 18

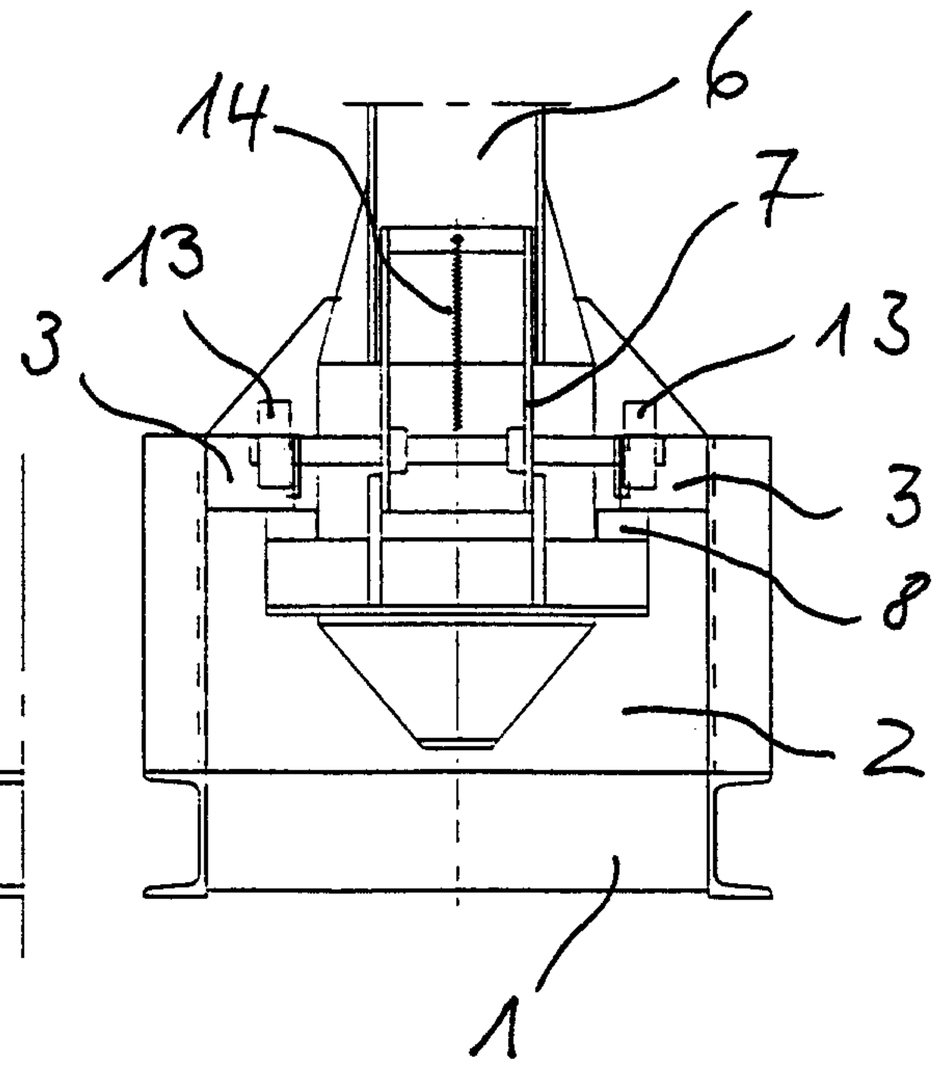


Fig. 19

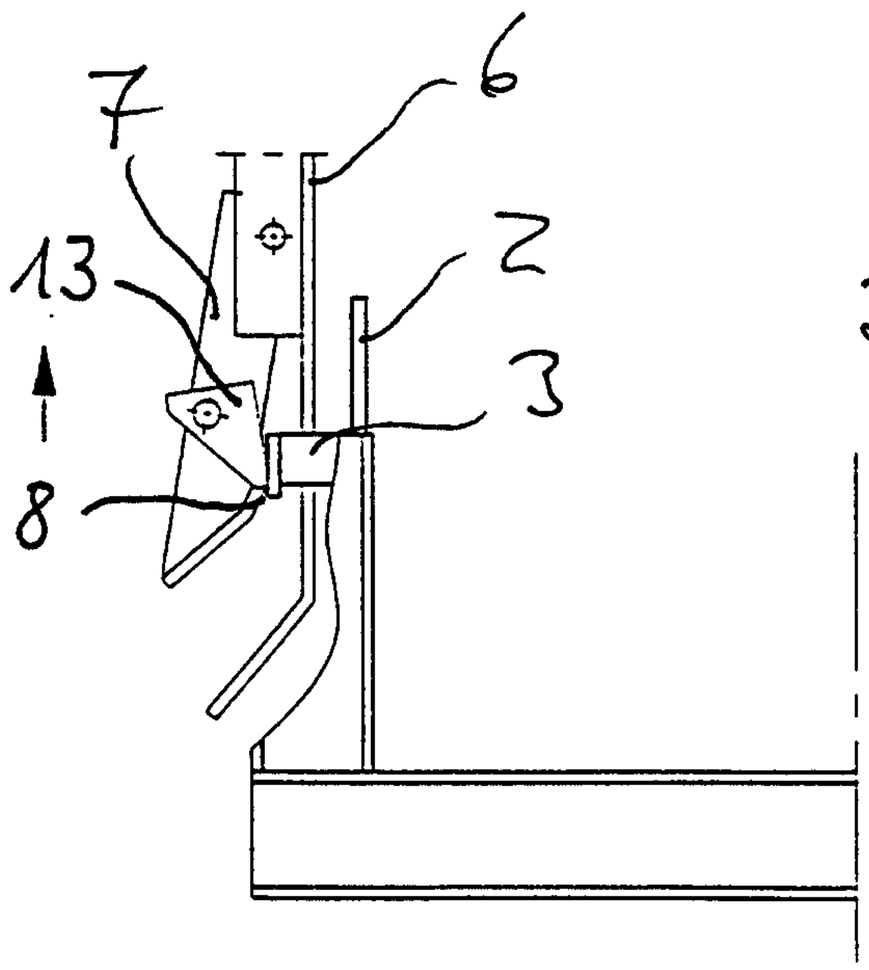


Fig. 20

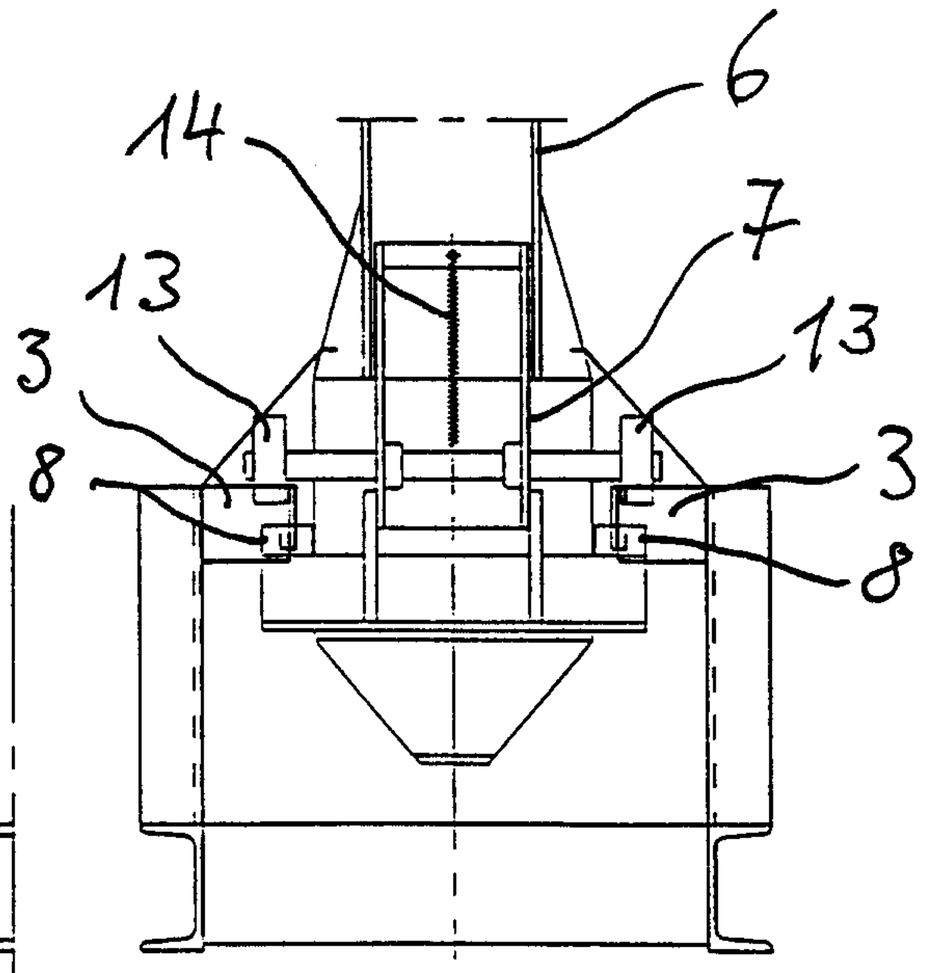
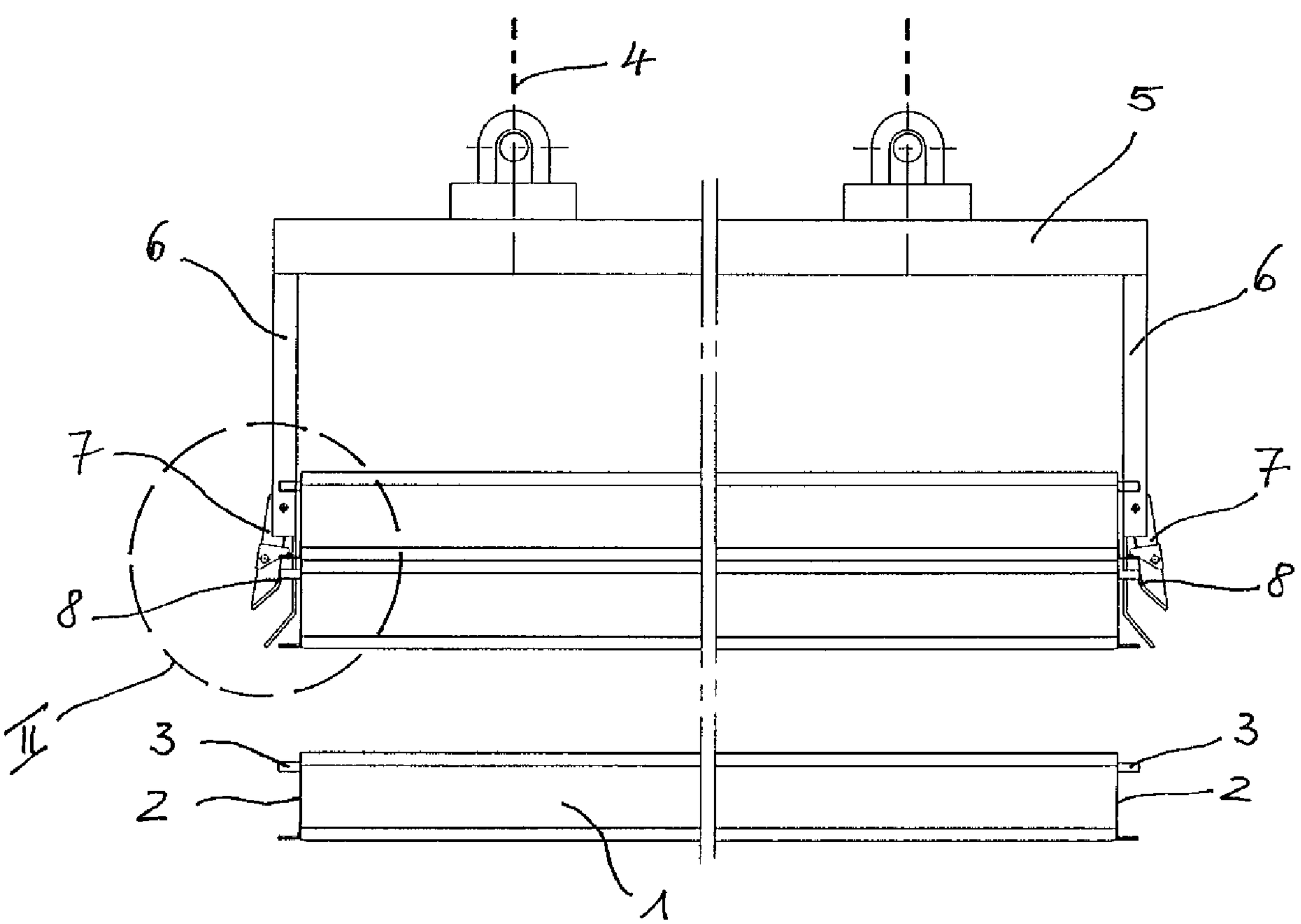


Fig. 21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