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(54) **Method for manufacturing a support part for a pick-up frame forming part of a loading system for emptying a container into a vehicle such as a refuse collection vehicle**

(57) The present invention relates to a method for manufacturing a support part (8) for a pick-up frame (4) forming part of a loading system for emptying a container, comprising the steps of:

- shaping a piece of plate material in order to form a carrier part (18), wherein the carrier part (18) is movable relative to the pick-up frame (4);
- forming a flexible material for realizing a contact part (30) between the carrier part (18) and the container;
- assembling the contact part (30) with the carrier part (18) using first fixing means (42); and
- fixing the carrier part (18) to the pick-up frame (4) using second fixing means (24).

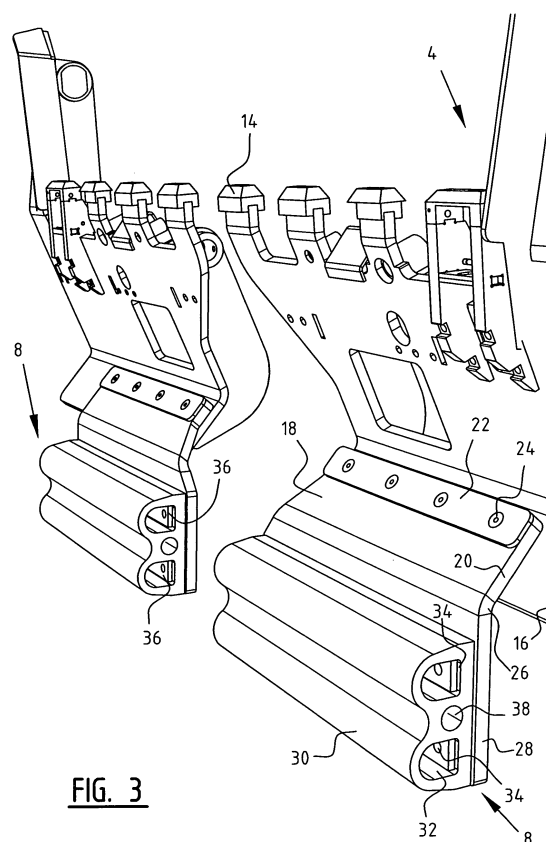


FIG. 3

Description

[0001] The present invention relates to a method for manufacturing a support part for a pick-up frame forming part of a loading system for emptying a container.

[0002] Known loading systems are used to empty for instance refuse bins into refuse trucks. The truck is herein provided at the rear with a loading system with a pick-up frame. Using a lifting mechanism, the loading system causes the refuse bin for emptying to undergo a pivoting movement. Such a pick-up frame herein hooks onto the container with its outer ends of the lifting mechanism, for instance in the form of lifting arms, and then makes the pivoting movement, whereby the refuse bin is placed substantially upside down above the refuse truck and the refuse for removal is emptied out of this container into the refuse truck. During the pivoting movement the container is supported with a carrier part.

[0003] Because the containers for emptying are generally situated on the ground, i.e. level with the vehicle, the pick-up frame must pick up or support the containers relatively low to the ground. This means that the pick-up frame is provided with various parts, such as the carrier part, which are situated relatively low to the ground. Since vehicles provided with a loading system with such a pick-up frame generally move in densely populated areas, such as villages and cities, such a vehicle must manoeuvre frequently in order to avoid obstacles such as posts and speed bumps. It has been found in practice that, among other obstacles, speed bumps frequently cause damage, particularly to the pick-up frame. This has the result, among others, of high maintenance and repair costs, limited availability of the vehicle and interruptions in the collection of refuse.

[0004] The present invention has for its object to provide a support part for a pick-up frame, wherein such damage and downtime are prevented or reduced in a user-friendly manner.

[0005] The present invention provides for this purpose a method for manufacturing a support part for a pick-up frame forming part of a loading system for emptying a container, comprising the steps of:

- shaping a piece of plate material in order to form a carrier part, wherein the carrier part is movable relative to the pick-up frame;
- forming a flexible material for realizing a contact part between the carrier part and the container;
- assembling the contact part with the carrier part using first fixing means; and
- fixing the carrier part to the pick-up frame using second fixing means.

[0006] By shaping a piece of plate material a carrier part is formed for the container or refuse bin. The container herein rests on this carrier part, wherein a flexible material is arranged between the carrier part and the container in order to form a contact part. Damage to the con-

tainer is prevented by the flexible material and a degree of damping is also provided, whereby among other things the transmission of undesirable vibrations is limited. Through the use of the flexible material instead of for instance moving parts, wear of such moving parts is also prevented. The support part is obtained by assembling this carrier part and contact part using the first fixing means. The carrier part is herein movable relative to the pick-up frame. This is for instance relevant if the vehicle on which the loading system is arranged reverses and for instance makes contact with a speed bump or kerb. In such a case the carrier part will give away or yield or bend, and damage and the like is avoided. The bending movement or rotating movement of the carrier part relative to the pick-up frame preferably takes part largely in an angle or edge which is formed during the shaping. If the vehicle moves forward and drives off a speed bump or kerb, it is also possible for the support part placed relatively low to the ground to make contact with the ground. Damage is in this case also prevented by providing this part for movement relative to the pick-up frame. This movement preferably takes place by tilting around a tilting point corresponding to the bending point of the carrier part as arranged during shaping of the carrier part. This tilting point is preferably situated on or close to the outer end of the lifting arm construction of the pick-up frame.

[0007] In a preferred embodiment according to the invention the carrier part is heated during shaping of the plate material and the carrier part is bent through an additional angle in order to compensate for the bending back during the cooling process.

[0008] Because the plate material, which is to some extent flexible, is cooled, some degree of bending back to the starting position of the plate material will take place. Already compensating for this during shaping avoids an extra process having to be performed on the carrier part.

[0009] In a preferred embodiment according to the invention at least one recess is provided during forming of the contact part.

[0010] The flexibility of the contact part is increased further by providing a recess in this contact part. A better support and damping of the container is hereby obtained. The at least one recess is preferably arranged extending in width direction of the loading system. A substantially uniform support is hereby obtained over the whole width.

[0011] In a further preferred embodiment according to the invention the forming of the carrier part also comprises of placing at least one strengthening rib in one or more of the recesses over at least a part of the length of this recess.

[0012] Arranging the at least one strengthening rib achieves that the contact part is strengthened such that it remains form-retaining and is better able to absorb the changing loads caused by the containers. An additional advantage is that the contact part can be connected to the carrier part by means of the strengthening rib, preferably via a screw connection. The number of compo-

nents and other parts hereby remains limited.

[0013] In a further embodiment according to the invention the carrier part is provided with an assembly surface with which the carrier part is connected to the pick-up frame.

[0014] By providing an assembly surface a connecting surface is obtained between the carrier part and the other parts of the pick-up frame. The forces which occur can hereby be transmitted better. It is hereby also possible to realize a good connection between the support part and the pick-up frame, such that these parts remain connected even when relatively great forces occur in the case of contact with a speed bump or kerb.

[0015] In a further preferred embodiment according to the invention, the shaping of the piece of plate material is performed on plate material manufactured from high-density polyethylene.

[0016] The use of high-density polyethylene (HDPE) results in a carrier part being obtained which is flexible to some extent and can move relative to the pick-up frame in order to absorb the loads which occur. These are not only loads resulting from the containers, but also loads resulting from contact with, among other obstacles, speed bumps and kerbs. The contact part is preferably formed from a rubber material so as to thereby realize sufficient flexibility and elasticity.

[0017] In a further preferred embodiment according to the invention the periphery of the contact part is provided in a kind of D-shape.

[0018] By forming the contact part in a kind of D-shape, wherein the bent side is in contact with the container, applied loads are absorbed better. Relatively heavy containers will further compress the contact part in order to thereby obtain a larger contact surface, whereby peak loads which occur can nevertheless remain limited.

[0019] The invention further relates to a loading system and a vehicle provided with such a loading system provided with a support part manufactured as according to one or more of claims 1-8. These provide the same effects and advantages as those stated in respect of the method.

[0020] Further advantages, features and details of the invention are elucidated on the basis of a preferred embodiment, wherein reference is made to the accompanying drawing, in which:

fig. 1 shows a side view of a vehicle provided with a loading system with support part according to the invention;

fig. 2 shows a detail view of the support part according to the invention;

fig. 3 is a view of the pick-up frame, shown in perspective, provided with a support part according to the invention;

fig. 4 shows a side view of a part of the pick-up frame with the support part of fig. 3;

fig. 5 shows a detail view of the support part of fig. 4; and

fig. 6 shows a side view according to fig. 4, wherein a heavier container is being lifted.

[0021] A vehicle 2 (fig. 1) is provided with a pick-up frame 4 with a protective part 6 arranged thereon. In the shown embodiment this protective part 6 protrudes furthest to the rear in the direction of travel. Pick-up frame 4 further has a support part 8 for supporting a refuse bin to be lifted.

[0022] Support part 8 (fig. 2) is situated relatively low to the ground and, in the case vehicle 2 moves in the direction indicated by arrow A, support part 8 will make contact with speed bump 10 when wheels 12 of vehicle 2 move off this speed bump 10. Support part 8 is movably connected to pick-up frame 4. In the case where pick-up frame 4 will make contact with the ground, such as speed bump 10, support part 8 will tilt relative to pick-up frame 4 in the direction indicated by arrow B without here permanently deforming.

[0023] Pick-up frame 4 (fig. 3) is provided with a number of hooks or forks provided with teeth 14 which engage under an edge of the container. The shown pick-up frame 4 consists of two mirrored parts with which it is possible, using the two parts, to empty two individual containers together or a container of larger dimensions. Pick-up frame 4 has an assembly surface 16 to which carrier part 18 of support part 8 is fixed. Carrier part 18 is provided for this purpose with an assembly surface 20. Assembly surface 20 is connected to the other part of pick-up frame 24 using strip 22 and fixing bolts 24. Support part 8 is further provided with an angular point 26 located close to the outer end of assembly surface 16 of pick-up frame 4. This angular point or tilting point 26 is situated between assembly surface 20 and the connecting carrier part 28 of carrier part 18. The connecting carrier part 28 is connected to contact part 30. This contact part 30 is provided with two relatively large recesses 32 in which a fixing surface 34 for strengthening rib 36 is arranged. In addition, contact part 30 is provided with a recess 38.

[0024] Support part 8 (fig. 4) serves to support a container 40 which is picked up using forks 14 of pick-up frame 4. Container 40 herein rests on support part 8 via contact part 30, which in the shown embodiment has a kind of D-shape. In the situation shown in fig. 4 the container 40 is in practically horizontal position, so halfway between the position set down on the ground and the emptying position above truck 2. Contact part 30 (fig. 5) is connected to the connecting carrier part 28 by means of a bolt connection 42. Strengthening rib 36 is provided for this purpose with screw thread into which bolt 42 can be screwed. The head of bolt 42 herein lies flush in the fixing carrier part 28 in order to prevent damage and even possible injury. In this fixing the strengthening rib 36 serves to clamp contact part 30, which is thereby connected to the connecting carrier part 28. Assembly surface 20 is connected to assembly surface 16 of pick-up frame 4 by means of a bolt connection 24. When a heavier container 40 is lifted (fig. 6), a greater force must be ab-

sorbed by contact part 30. For the shown embodiment fig. 4 shows the setting-down of an emptied container 40 and fig. 6 shows the lifting of a container 40 which is still full.

[0025] In order to empty a container 40 the hooks 14 of pick-up frame 4 engage under the edge of container 40. Through rotation of the lifting arms of pick-up frame 4 container 40 tilts and makes a pivoting movement from the ground to a position above refuse truck 2. Container 40 is herein supported by support part 8, wherein container 40 rests on contact part 30. If the pick-up frame makes contact with an obstacle or the ground during travel of vehicle 2, support part 8 will co-displace through bending or rotation of connecting carrier part 28 around the shaped angle or tilting point 26 in order to prevent, or at least limit, damage and the like.

[0026] The present invention is by no means limited to the above described embodiment; the rights sought are defined by the following claims, within the scope of which many modifications can be envisaged. It is thus possible for instance to provide tilting point 26 as a hinge in order to realize an even greater degree of flexibility. Contact part 30 can also be embodied as a single element together with carrier part 18. This has the advantage that the individual components do not have to be assembled. It is for instance also possible to have carrier part 18 form an integral part of pick-up frame 4. Another possible option is to fill recesses 32 and/or 38 wholly or partially with material, wherein this material can be of a type different from that of contact part 30. This can for instance achieve that a better positioning of container 40 on support part 8 is obtained, wherein the degree of damping by support part 8 is for instance adjusted to the specific requirements made thereof.

Claims

1. Method for manufacturing a support part for a pick-up frame forming part of a loading system for emptying a container, comprising the steps of:
 - shaping a piece of plate material in order to form a carrier part, wherein the carrier part is movable relative to the pick-up frame;
 - forming a flexible material for realizing a contact part between the carrier part and the container;
 - assembling the contact part with the carrier part using first fixing means; and
 - fixing the carrier part to the pick-up frame using second fixing means.
2. Method as claimed in claim 1, wherein the plate material is heated during shaping and the carrier part is bent through an additional angle in order to compensate for the bending back during the cooling process.
3. Method as claimed in claim 1 or 2, wherein at least one recess is provided during forming of the contact part.
4. Method as claimed in claim 3, wherein the at least one recess is arranged extending in width direction of the loading system.
5. Method as claimed in claim 3 or 4, wherein the forming of the support part comprises of placing at least one strengthening rib in one or more of the recesses over at least a part of the length of this recess.
6. Method as claimed in one or more of the claims 1-5, wherein the carrier part is provided with an assembly surface with which the carrier part is connected to the pick-up frame.
7. Method as claimed in one or more of the claims 2-6, wherein the shaping of the piece of plate material is performed on plate material manufactured from High-Density Polyethylene.
8. Method as claimed in one or more of the claims 1-7, wherein the forming of the contact part is performed with a rubber material.
9. Method as claimed in one or more of the claims 1-8, wherein the periphery of the contact part is provided with a kind of D-shape in order to enable better absorption of applied loads.
10. Loading system for emptying a container, comprising:
 - a pick-up frame for picking up, tilting and replacing the container; and
 - a support part manufactured as claimed in one or more of the claims 1-8.
11. Vehicle provided with a loading system as claimed in claim 10.

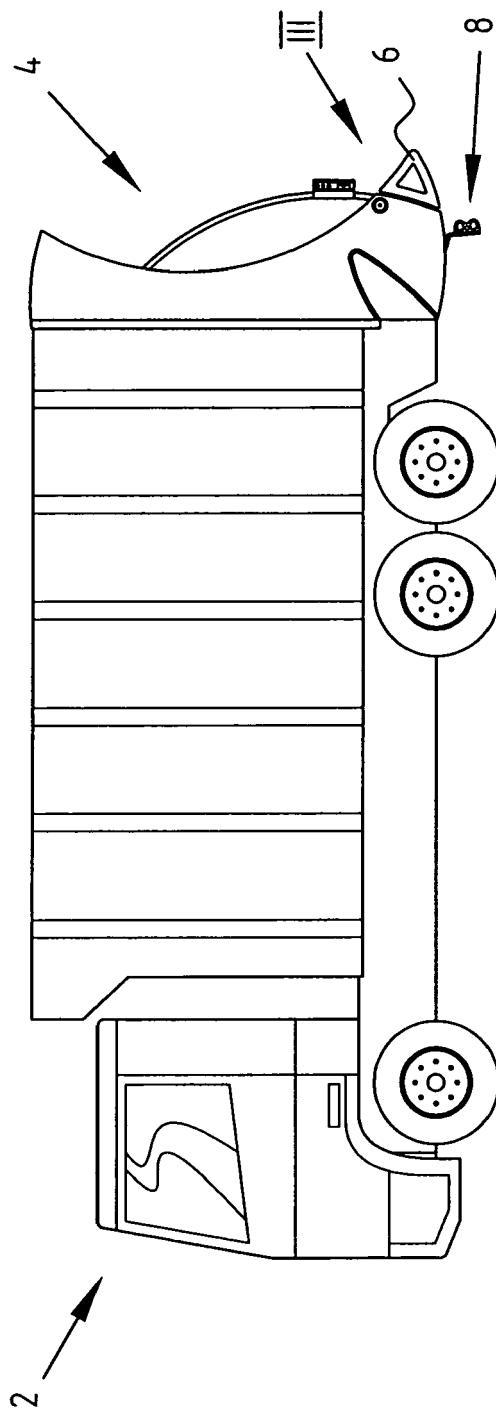


FIG. 1

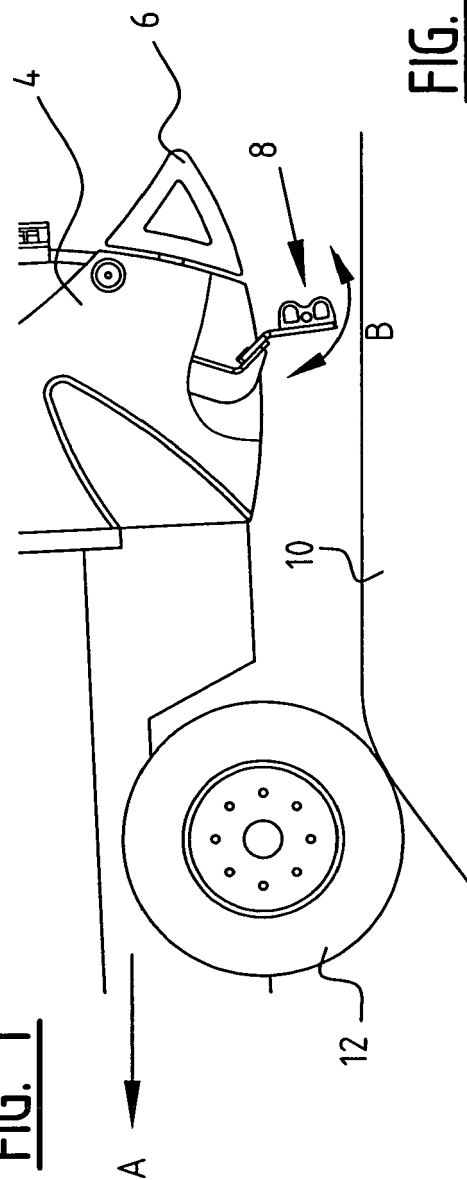


FIG. 2

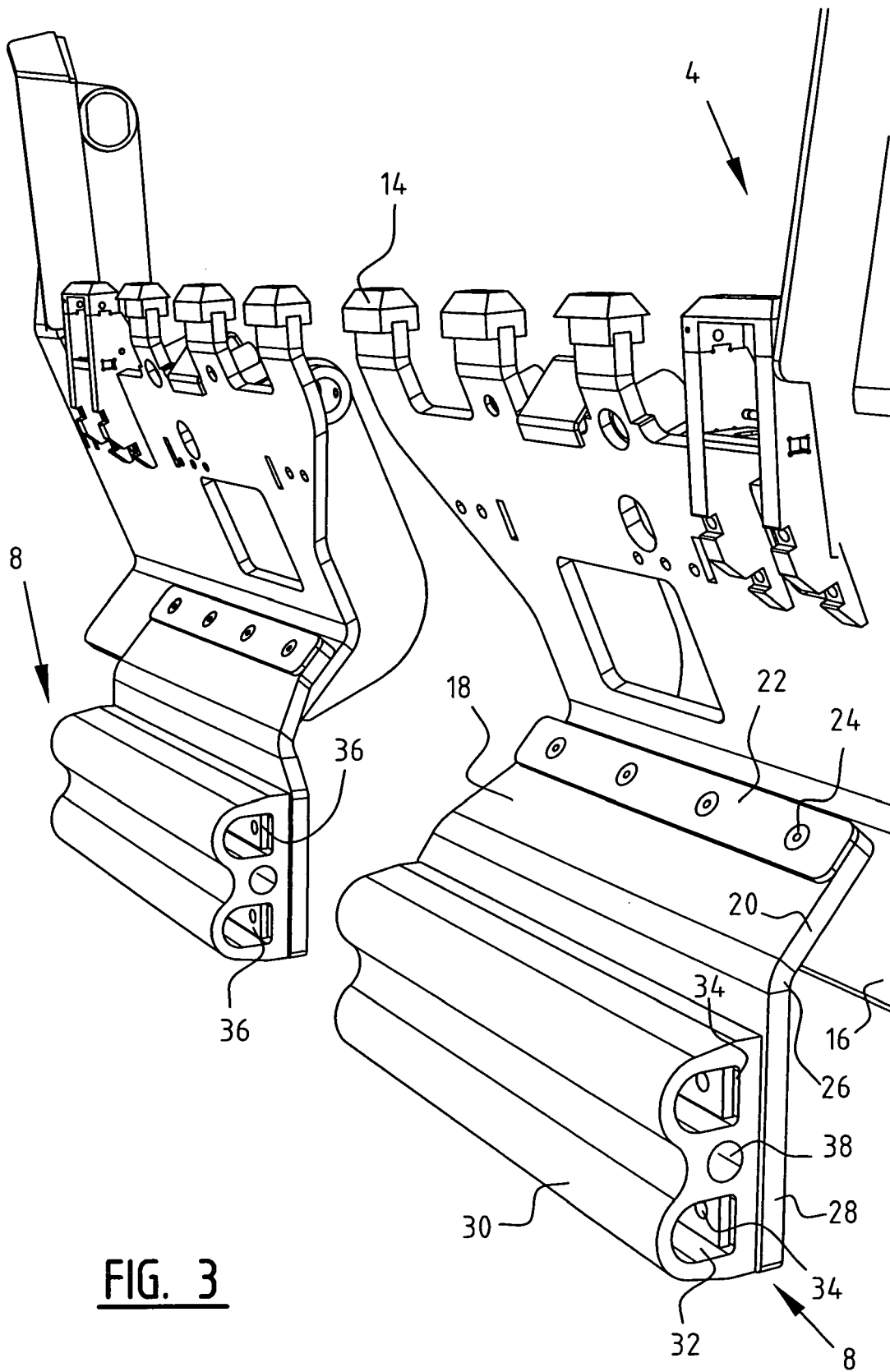
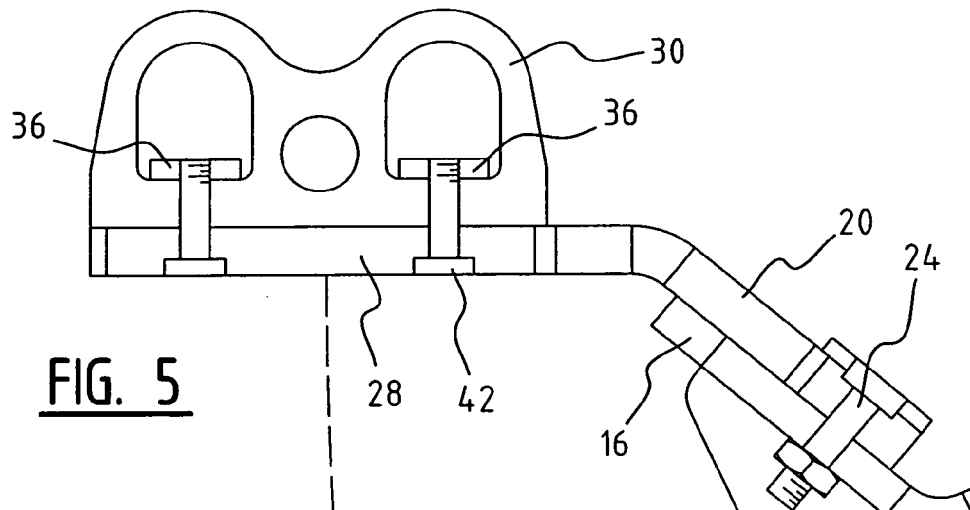
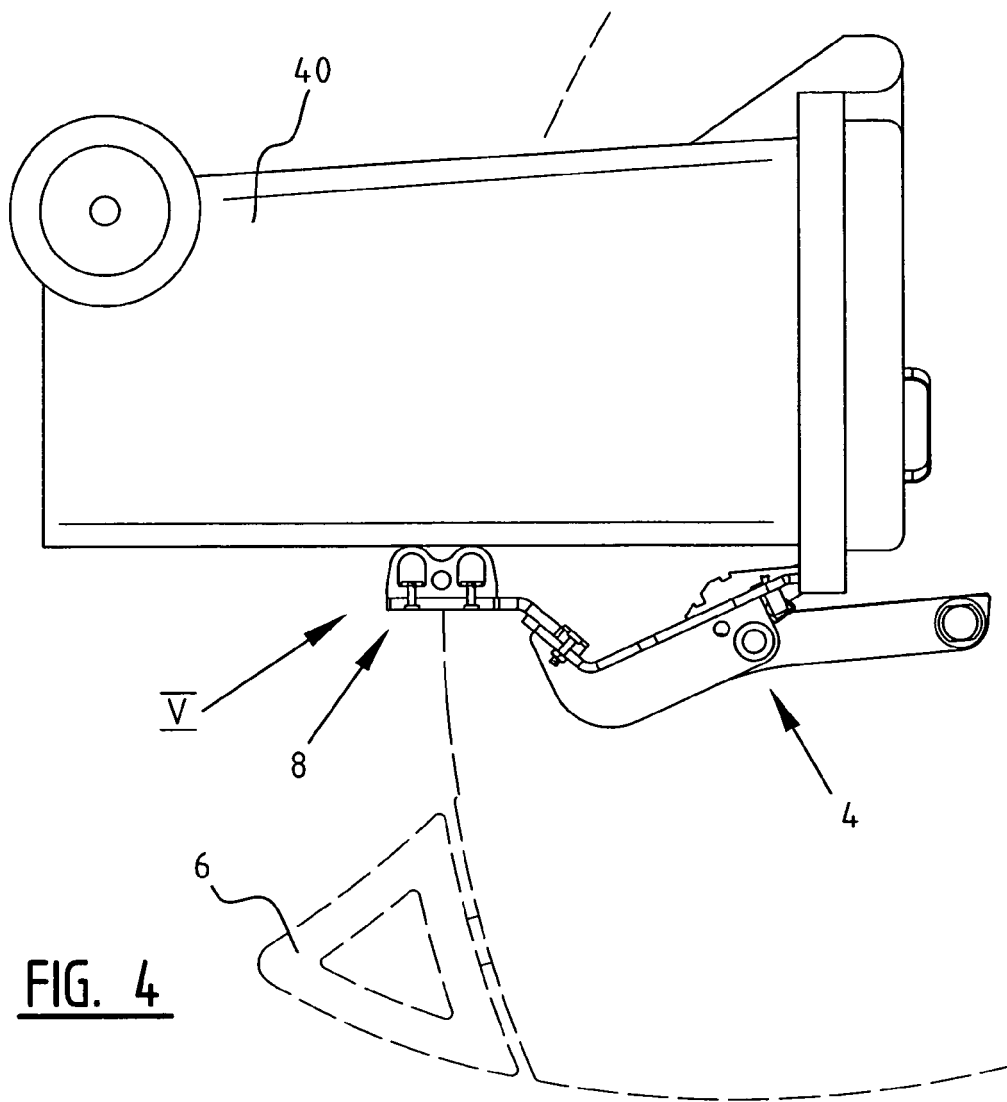


FIG. 3



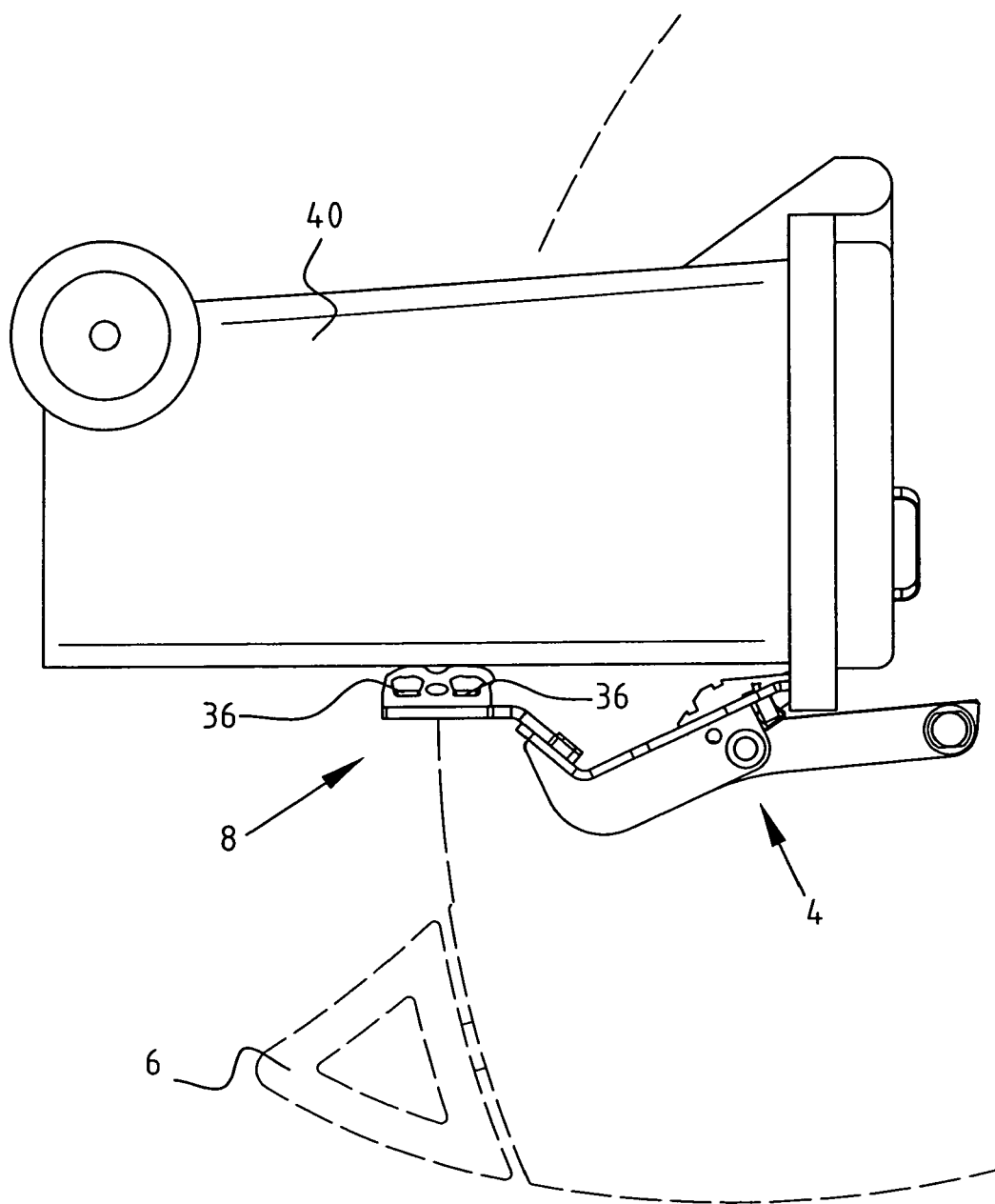


FIG. 6



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 08 07 5089

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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		19 May 2008	Smolders, Rob
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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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 08 07 5089

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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