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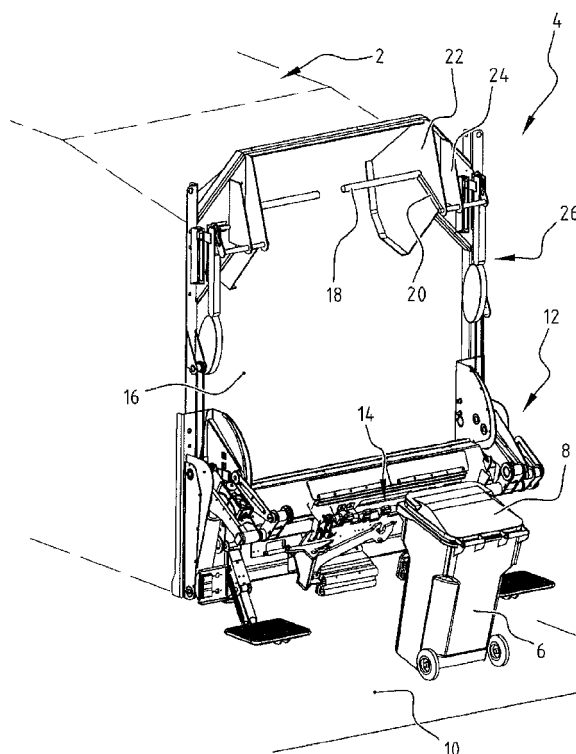
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(54) **Stop member for bounding a tilting movement of a container during emptying thereof**

(57) The invention relates to a stop member for bounding a tilting movement of a container (6) during emptying thereof, comprising a bounding element (18) for stopping the container (6), a spring element (42) operatively connected to the bounding element (6) for re-

alizing an operative range around a bounding position for the purpose of dealing with different container dimensions, and a mechanical and/or hydraulic activating mechanism (26) for actuating the bounding element (18) between a rest position and a bounding position.



**FIG. 1**

## Description

**[0001]** The present invention relates to a stop member for bounding a tilting movement which a container, for instance a bin, undergoes during emptying thereof. Such a stop member is used particularly in a collector as applied for instance in a refuse truck for the purpose of preventing such containers falling into the collector.

**[0002]** Bins or containers filled with for instance waste, such as domestic refuse, waste paper, green waste etc., are usually collected using refuse trucks. Such refuse trucks are usually provided in practice with a loading system with which the containers can be lifted and emptied into the refuse truck with a tilting movement or pivoting movement. Containers or bins have to be stopped during this movement using a stop member.

**[0003]** A problem here is that various different dimensions are applied in practice for the individual types of container or bin. This has the result, among others, of damage to the container when a container of different size is emptied. Stop members known in practice usually make use of complex systems comprising complex controller and actuators for adapting the movement of the stop member to the type of container to be emptied.

**[0004]** The present invention has for its object to provide a stop member provided with a relatively advantageous and robust mechanism for the purpose of obviating or at least reducing the above stated problems.

**[0005]** This object is achieved with the stop member for bounding a tilting movement of a container during emptying thereof according to the invention, wherein the stop member comprises:

- a bounding element for stopping the container;
- a spring element operatively connected to the bounding element for realizing an operative range around a bounding position for the purpose of dealing with different container dimensions; and
- a mechanical and/or hydraulic activating mechanism for actuating the bounding element between a rest position and the bounding position.

**[0006]** By providing a bounding element, preferably in the form of a rod-like body, a container is stopped during the tilting movement as it is being emptied. The bounding element is for this purpose preferably moved from a rest position to the bounding position during the tilting movement. This movement makes it possible for the container to be rotated with the opening side, after which the side of the container comes into contact with the stop member. The two movements of the container and the stop member are adapted to each other for this purpose. According to the invention this adaptation takes place using a mechanical and/or hydraulic activating mechanism for actuating the bounding element between the rest position and the bounding position.

**[0007]** An operative range around a bounding position is provided according to the invention by operatively con-

necting a spring element to the bounding element. This makes it possible for a container which is being emptied and has different dimensions to come into contact with the stop member and, as a result of the operative range, to remain free of damage while the content is removed from the container. This is realized in that larger dimensions of a container usually also mean a heavier weight such that the spring element is compressed, elongated and/or twisted depending on the position of this spring element, and thereby enables the greatest possible stroke. A smaller size container usually has a lower weight and will therefore need to make less use of the operative range.

**[0008]** The activating mechanism is preferably activated directly by the tilting movement such that in the bounding position the bounding element comes into contact with the container. This is preferably brought about by mutually connecting the activating mechanism and the tilting mechanism via a direct connection in order to thereby realize the desired adjustment. A mechanical activating mechanism according to the invention is for instance realized by a direct coupling between the tilting mechanism for the container and the activating mechanism for the stop member. This direct coupling can for instance take place by means of a shaft connection, a hinge connection, a cam follower system as well as by means of a hydraulic connection using for instance two cylinders. Other mechanisms are also possible according to the invention. Also included here are embodiments making use of a chain, rope or belt. In a currently preferred embodiment a purely mechanical connection is recommended, such as a cam follower system, since maintenance and malfunction are thereby limited.

**[0009]** Examples of different types of container occurring in practice are EN 840-1, -2, -3 and -4. Other types of bin or container can likewise be emptied using the stop member according to the invention.

**[0010]** A robust and reliable system for bounding the tilting movement of the bin or container to be emptied is obtained through use of the bounding element in combination with the spring element and the activating mechanism. It has also been found that the maintenance required and malfunctions occurring are further minimized compared to the relatively complex systems known in practice. This complexity is for instance caused by applying a range of sensors requiring additional components, control, maintenance. It is further also possible to dispense with time delays and/or time switches as applied in such complex systems known in practice.

**[0011]** In an advantageous preferred embodiment according to the present invention the direct connection between the tilting mechanism and the activating mechanism adapts the movements of these respective mechanisms to each other immediately following emptying of the container.

**[0012]** Adapting the movements following emptying of the bin or container avoids the stop member and the container coming into contact with each other while being

set down and damage being caused to for instance a lid of the container.

**[0013]** In an advantageous preferred embodiment according to present invention the stop member comprises a blocking means for blocking the stop member.

**[0014]** The stop member can be fixed, particularly in the rest position, by providing a blocking means. This achieves that an additional safety means is realized if a container or bin presses through the operative range or movement range, for instance in the case of large containers. It is also possible to empty containers, or otherwise place objects in a collector or refuse truck, without making use of the stop member. This increases the flexibility of the whole stop member according to the invention.

**[0015]** The blocking means is preferably operatively connected to a release element. Operation of this release element releases the blocking means and leaves the bounding element free for use during a subsequent emptying of a container. The container preferably activates the release element here during the tilting movement of the subsequent container. This achieves a highly advantageous operation, wherein it is possible to dispense with complicated controls.

**[0016]** The invention further relates to a collector provided with a stop member as described above.

**[0017]** Such a collector provides the same effects and advantages as those stated for the stop member. In an advantageous embodiment the collector comprises a second stop member as described above, and the collector is provided here with a control element for synchronous or independent control of the two stop members. The control element is preferably able to enable a synchronous or separate operation of the two stop members as desired. This can be applied advantageously in for instance refuse trucks provided with two tilting mechanisms, such that relatively small bins or containers can be emptied independently of each other and large bins or containers can be emptied together in a synchronous operation with the two systems.

**[0018]** The invention further also relates to a refuse truck provided with a collector as described above. Such a refuse truck provides the same effects and advantages as those stated for the stop member and/or the collector.

**[0019]** The invention further also relates to a method for bounding a tilting movement of a container during emptying thereof into a collector, comprising of providing a stop member and/or collector as described above.

**[0020]** Such a method provides the same effects and advantages as those stated for the stop member, collector and/or refuse truck.

**[0021]** Further advantages, features and details of the invention are elucidated on the basis of a number of preferred embodiments thereof, wherein reference is made to the accompanying drawings, in which:

- Figure 1 shows a view of a collector for a refuse truck provided with the stop member according to the in-

vention;

- Figure 2 shows a view of the stop member of figure 1;
- Figures 3-5 show views of the different stages of the tilting moment with the stop member of figure 1; and
- Figure 6 shows a view of the emptying of a large container with a dual stop member.

**[0022]** A refuse truck 2 (figure 1) is provided with a loading system 4 with which containers 6 provided with a lid 8 can be lifted from a ground surface 10 using lifting mechanism 12, and particularly toothing 14 thereof, such that the content can be emptied into collecting space 16. Loading system 4 is provided here with a stop bar 18 which is attached to arm 20 and fixed to loading system 4 using partitions 22, 24. Follower mechanism 26 provides for the movement of stop bar 18 during tilting of container 6 using lifting mechanism 12. In the shown embodiment two lifting mechanisms 12 are provided adjacently of each other. Independent operation can hereby be applied for the purpose of emptying two containers 6 independently of each other and/or a synchronous operation can be applied for the purpose of emptying a single large container which is picked up and set down using the two lifting mechanisms 12.

**[0023]** Container 6 is picked up from ground surface 10 using lifting mechanism 12. During this movement container 6 is carried from an upright position via a substantially horizontal position (figure 2) to an emptying position (figures 3 and 4, with figure 4 being a view from refuse truck 2). In the emptying position this container 6 is carried into a position such that lid 6 falls open or, in an alternative embodiment, is guided by additional guides, and the content of container 6 is carried into collecting space 16. Container 6 rests here on support block 28. Container 6 is bounded in the emptying position by stop bar 18 which ensures that container 6 does not fall into collecting space 16.

**[0024]** Follower mechanism 26 (figures 5 and 6) is provided with a cam 30 with which a cam follower 32 is in contact during use. A first outer end of cam follower 32 follows this cam 30. The other outer end of cam follower 32 is connected to guide 34 using catch or profile 36. In the shown embodiment an arm 38 is provided on the same outer end. Arm 38 is further provided with a recess 39 for guiding purposes. Situated on the outer end of arm 38 is shaft 40 which runs through partitions 22, 24. In the shown embodiment a spring element 42 is arranged between partitions 22, 24. Cam 30 is rotated via connection 44 with which the follower mechanism 26 is in direct mechanical connection to lifting mechanism 12.

**[0025]** Also provided is a fixation element 46, wherein shaft 40 can be fixed using tongue 48. Release element 50, for instance in the form of a catch, removes tongue 48 such that shaft 40 can again be released and stop bar 18 is once again functional. In the shown embodiment spring element 42 is embodied as a first flange 52 provided on the side of stop bar 18, a second flange 54 provided on the side of arm 38 and a spring block 56

provided between flanges 52, 54. It will be apparent that other embodiments of spring element 42 are also possible.

**[0026]** When a container 6 has to be emptied it is picked up from ground surface 10 using lifting mechanism 12. During the lifting movement (figures 1-4) container 6 undergoes a pivoting or tilting movement. In order to prevent container 6 being precipitated into collecting space 16 a stop bar 18 is positioned to stop container 6. According to the invention follower mechanism 26 is directly connected to lifting mechanism 12 using a direct mechanical connection 44 such that the movement of stop bar 18 is adapted to the pivoting movement of container 6. A robust and reliable mechanical system is hereby realized. Additional maintenance time and/or complex components, including control, are no longer necessary here. According to the invention stop bar 18 is connected to a spring element 42 such that some operative range results and stop bar 18 can undergo a small change in position, for instance as a result of the weight and/or dimensions of container 6, without follower mechanism 26 being affected. Avoided in this way is that damage is caused to a container 6 of a slightly differing size that is being emptied. After container 6 has been emptied, it is set down again on ground surface 10, wherein a reverse movement is followed. Follower mechanism 26 provides here for a return movement of stop bar 18 which is likewise adapted to the movement of container 6.

**[0027]** In an alternative embodiment follower mechanism 26 takes a hydraulic form. Use is made here of two hydraulic cylinders connected operatively to each other. These cylinders transmit the movement of container 6 during the tilting movement via a first cylinder to a second cylinder, and thereby to stop bar 18. As a result stop bar 18 undergoes a movement adapted to the tilting movement of container 6. A reverse movement takes place during setting down.

**[0028]** The present invention is by no means limited to the above described preferred embodiments thereof. 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 embody spring element 42 as a kind of flexible sleeve around stop bar 18. Other embodiments are also possible.

## Claims

1. Stop member for bounding a tilting movement of a container during emptying thereof, the stop member comprising:

- a bounding element for stopping the container;
- a spring element operatively connected to the bounding element for realizing an operative range around a bounding position of the stop member for the purpose of dealing with different container dimensions; and

- a mechanical and/or hydraulic activating mechanism for actuating the bounding element between a rest position and the bounding position.

2. Stop member as claimed in claim 1, wherein the activating mechanism is activated by the tilting movement such that the bounding element comes into contact with the container in the bounding position.
3. Stop member as claimed in claim 1 or 2, wherein the spring element is configured such that diverse container dimensions can be handled.
4. Stop member as claimed in claim 1, 2 or 3, wherein the activating mechanism and a tilting mechanism for performing the tilting movement of the container are mutually connected via a direct connection in order to adapt respective movements for emptying the container.
5. Stop member as claimed in claim 4, wherein the direct connection comprises a cam follower system.
6. Stop member as claimed in claim 4 or 5, wherein the direct connection adapts the respective movements for setting down the container immediately following emptying of the container.
7. Stop member as claimed in one or more of the foregoing claims, further comprising a blocking means for blocking the stop member.
8. Stop member as claimed in claim 7, further comprising a release element operatively connected to the blocking means.
9. Stop member as claimed in claim 8, wherein a container for emptying activates the release element during the tilting movement.
10. Collector provided with a stop member as claimed in one or more of the foregoing claims.
11. Collector as claimed in claim 10, further comprising a second stop member as claimed in one or more of the foregoing claims 1-9 and provided with a control element for synchronous or independent control of the two stop members.
12. Refuse truck provided with a collector as claimed in claim 10 or 11.
13. Method for bounding a tilting movement of a container during emptying thereof into a collector, comprising of providing a stop member and/or collector as claimed in one or more of the foregoing claims.

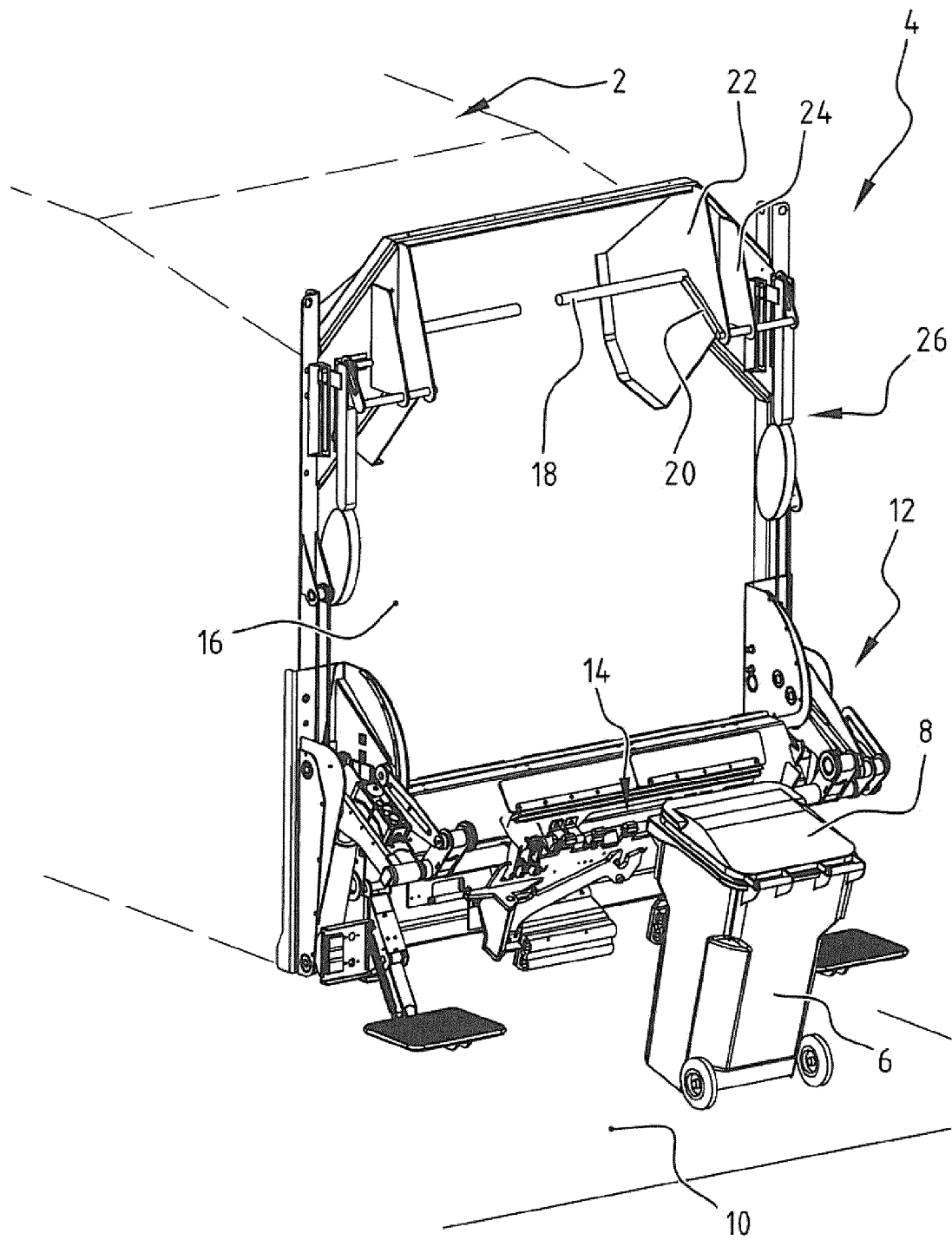


FIG. 1

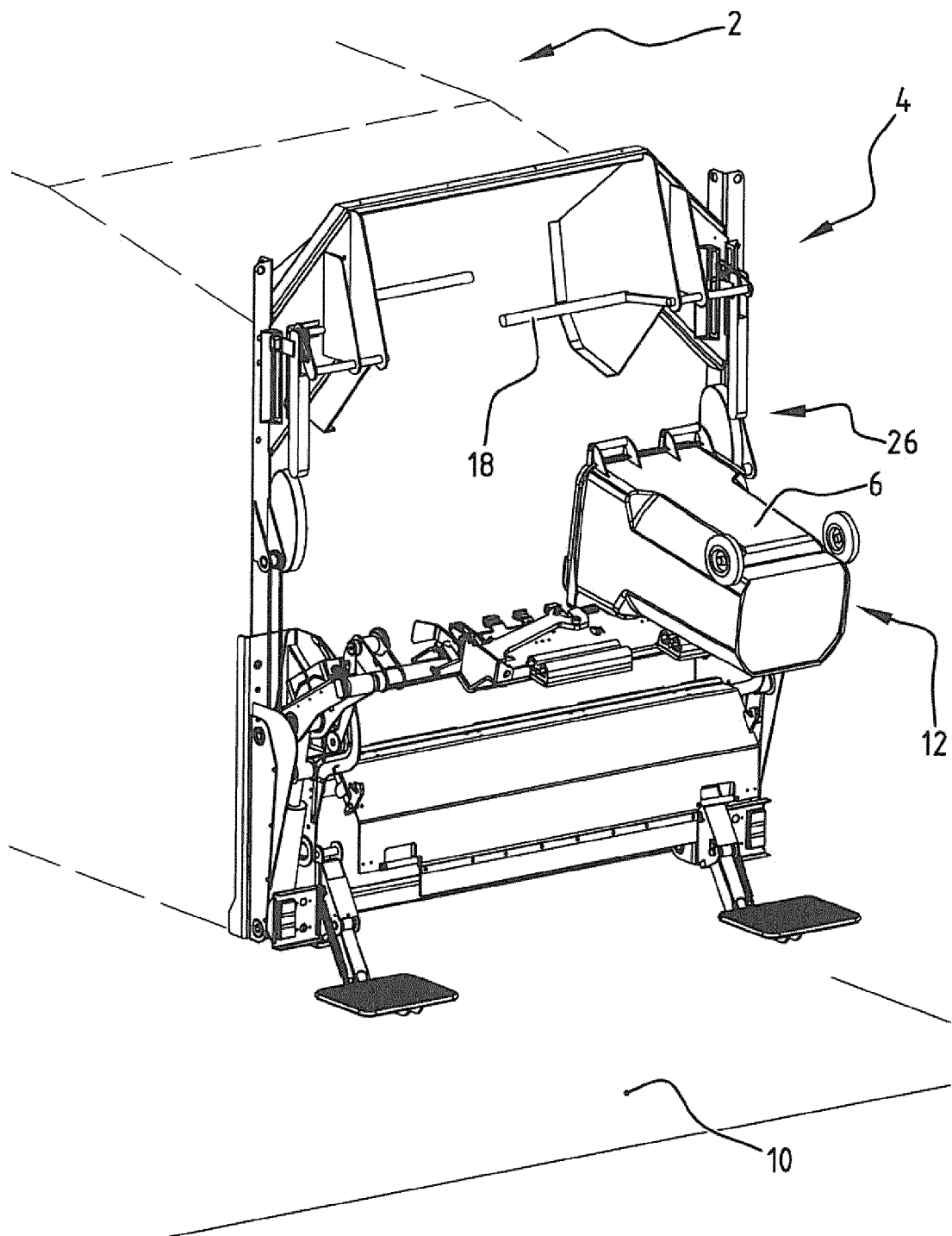


FIG. 2

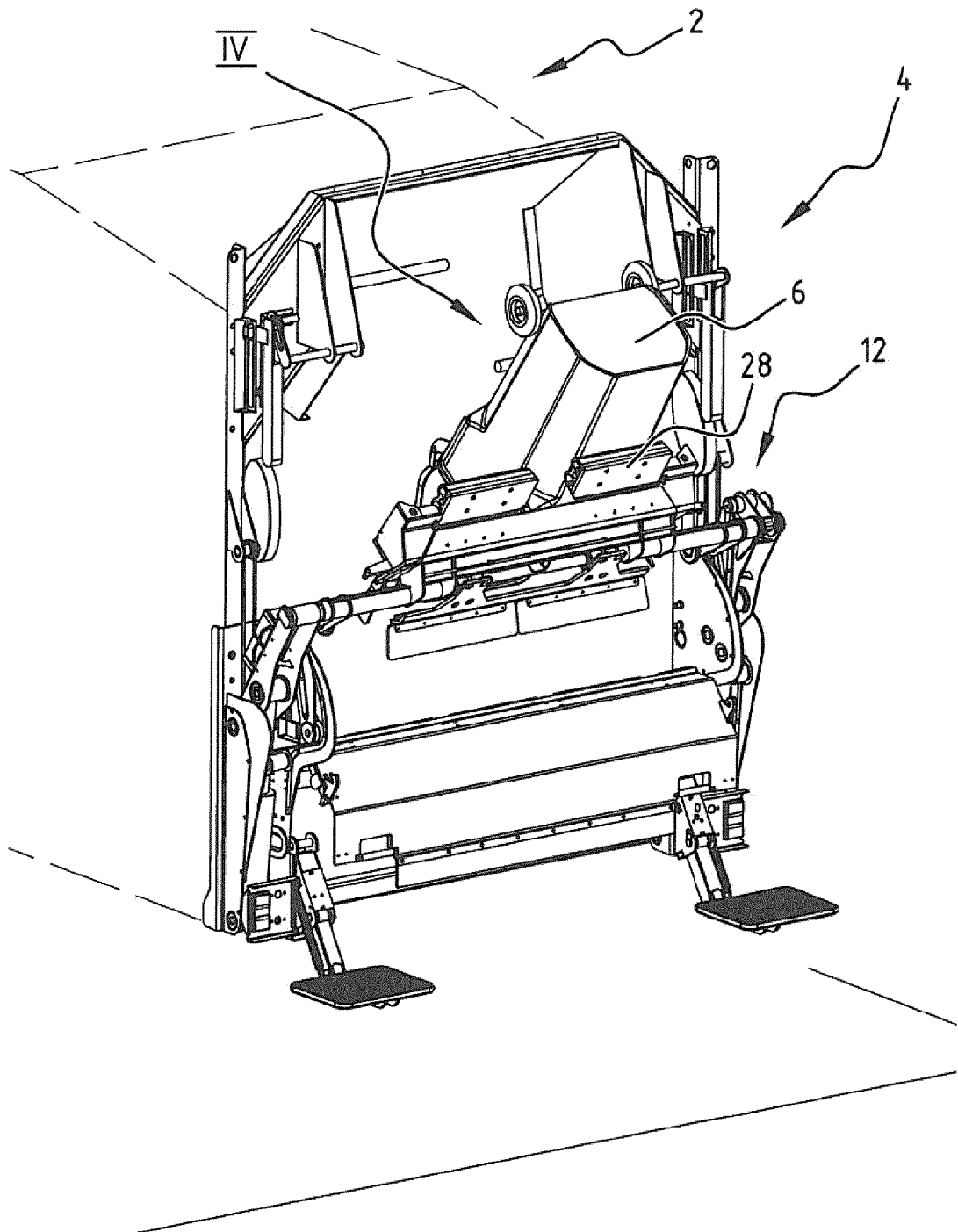
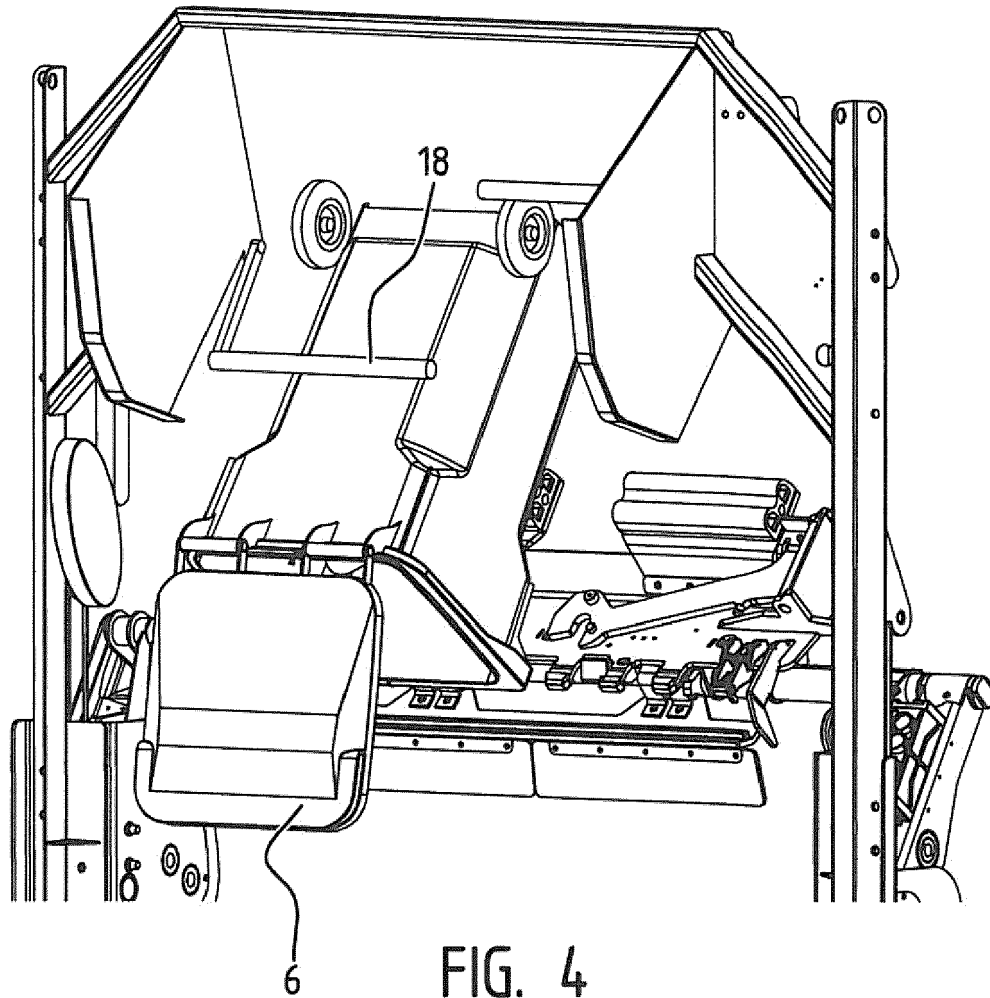


FIG. 3





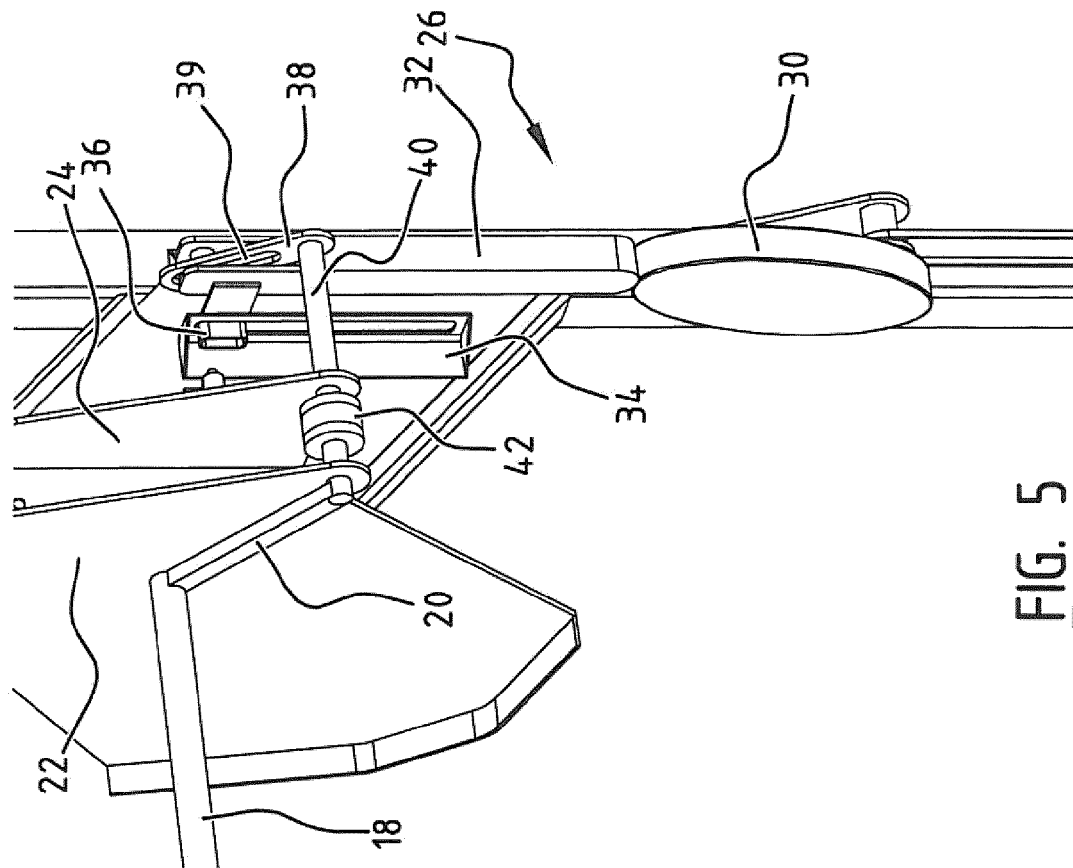


FIG. 5

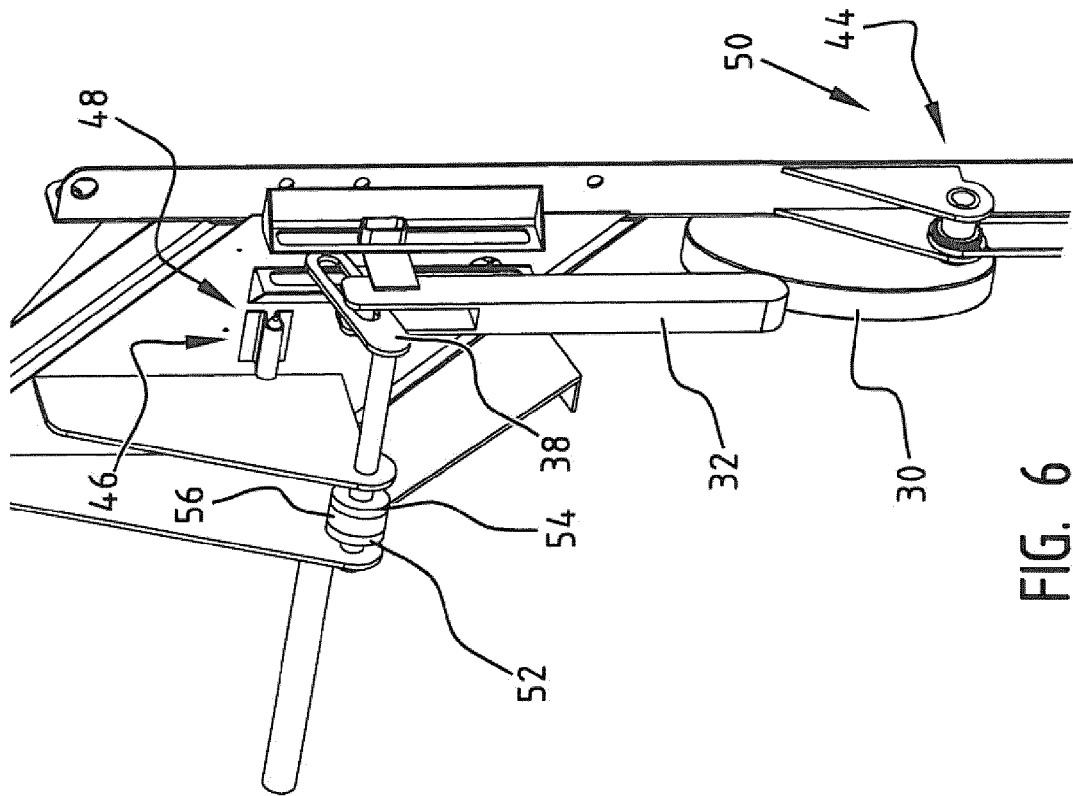


FIG. 6



## EUROPEAN SEARCH REPORT

Application Number  
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<p>CATEGORY OF CITED DOCUMENTS</p> <p>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</p> <p>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 ..... &amp; : member of the same patent family, corresponding document</p>			

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**ANNEX TO THE EUROPEAN SEARCH REPORT  
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
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