

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) Publication number:

0 464 950 A1

(12)

EUROPEAN PATENT APPLICATION(21) Application number: **91201698.7**(51) Int. Cl.⁵: **B65F 3/08**(22) Date of filing: **03.07.91**(30) Priority: **05.07.90 NL 9001533**(43) Date of publication of application:
08.01.92 Bulletin 92/02(84) Designated Contracting States:
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NL-2596 HG Den Haag(NL)(54) **Container loading and emptying device for a refuse vehicle.**

(57) The invention relates to a loading and emptying device for a refuse vehicle (1) comprising an endless carrier (8,8'), running in a substantially vertical plane, one or more pick up members (10) attached to the endless carrier (8,8') and tilting means for tilting a container, whereby it is provided according to the invention that the pick up member or pick up members (10) are pivotable around an attachment member or members (29), attaching the pick up member or members (10) to the endless carrier (8,8'), whereby the pivot axis are perpendicular to the plane of the endless carrier (8, 8') and that tilting means (34,35,38,30,31,36,37) are provided in such a way that the pick up member or members (10) turn through an angle of 360° along the path of the endless carrier (8,8').

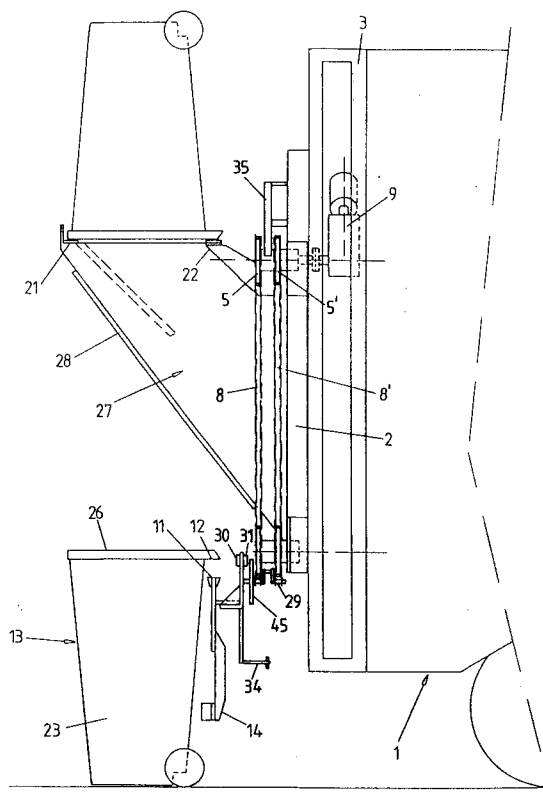


FIG. 4

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The invention relates to a loading and emptying device for a refuse vehicle comprising an endless carrier, running in a substantially vertical plane, one or more pick up members attached to the endless carrier and tilting means for tilting a container.

Such a device is known from the German Patent 432.470. This known device has an endless carrier, consisting of two parallel chains, running in the longitudinal direction around the body of a refuse vehicle. Pairs of T- or U-shaped hooks are fixedly connected to the chains, which serve as pick up members for refuse containers. A refuse container with a rod extending at both sides, is placed on a raised platform at the back of the refuse vehicle with the extending parts of the rod close to the endless carrier. The next pair of hooks pick up the container and transport it along the path of the endless carrier.

The container is brought into an inverted position by putting it over a steep bulge, whereby immediately after passing the top of the bulge it lands on a spring supported plate, in order to prevent it from falling out of the hooks. After passing the refuse collecting compartment of the vehicle the container reaches the downwardly directed part of the path of the endless carrier, where it falls out of the hooks and with the extending parts of the rod into a pair of arc shaped guides upwardly directed, where it returns to its starting position.

One of the disadvantages of this known device is that the pick up member consisting of a pair of hooks, is fixedly connected to the endless carrier, so that in order to tilt the container, the container has also to be repositioned relative to the pick up member. Furthermore the freedom of movement of the container is restrained by the chains of the endless carrier as a result of which the container has to be dropped out of the hooks in order to get it back to its starting position.

The container returns to its starting position at the front of the refuse vehicle. Because controlling the movement of the container requires a lot of space, tilting it through an angle of 180° and back again over the same angle; this known device is not suited to be placed at for instance the backside of a refuse vehicle.

In order to overcome these disadvantages it is provided according to the invention that the pick up member or pick up members are pivotable around an attachment member or members, attaching the pick up member or members to the endless carrier, whereby the pivot axis are perpendicular to the plane of the endless carrier and that tilting means are provided in such a way that the pick up member or members turn through an angle of 360° along the path of the endless carrier.

Herewith it is possible to secure the container to a pick up member, which member can rotate freely relative to the endless carrier.

It is also provided by the invention that the path of the endless carrier has two vertical and two horizontal parts, whereby the tilting means are mounted in such a way that at the angular points between the upper horizontal part and the two vertical parts the pick up member or members are turned through an angle of 180° .

The container reaches its inverted position at the upper horizontal part of the path where it is emptied in a receiving member of the refuse vehicle. Because the container is tilted in two controlled steps through an angle of 360° , in order to empty the container and to bring it back in its starting position, the space needed for the device can be small enough to be able to locate the device at the backside of the refuse vehicle.

From U.S. Patent 4,090,626 a container loading device is known with two parallel endless chains and a pick up member with U-shaped hooks connected to each other by a beam. The hooks are to engage support means of a container which can be secured in the hooks. The container goes upwardly to an inverted position and back to its starting position along the same path.

Also with the device of U.S. Patent 4,219,298 the container goes the same way back as it was lifted. Here the pick up member moves up and down a chain by means of a hydraulic motor in the pick up member.

With both these devices the pick up member follows back the same path as it came up. This means that before the next container can be handled, the last container has to be brought back to its starting position and to put aside. In practice this means that the time passed between the emptying of two successive containers, equals the time needed to get the container down, take it away, collecting the next container and bringing it up to its inverted position.

With the invention there is no need to wait until a container is emptied and put back to its starting position before a next container can be handled. This means that the time between the emptying of two successive containers can be much shorter than with the systems of the U.S. patents mentioned above, and consequently a refuse vehicle with the device according to the invention can empty far more containers per day than with one of the other known devices.

According to a first embodiment of the invention it is provided that the tilting means consists of a boss in each of the corners between the upper horizontal and the two vertical parts of the path of the endless carrier and two rolls mounted on the pick up member on either side of the pivot point

thereof, whereby the respective rolls engage the respective bosses with the movement of the pick up member through the upper bends of the path of the endless carrier.

Herewith, together with a guide for both rolls on the pick up member mounted between the two tilting points, a controlled movement of the container is obtained.

The lower horizontal part of the path of the endless carrier is mounted at such a height, that there the pick up member is no longer in engagement with the container. A container is picked up at the beginning of a vertical part of the path of the endless carrier where guides may be mounted to guide the container to the right position and is put back at the end of the other vertical part of the path, because the container touches the ground before the pick up member reaches the lower horizontal part of the path.

Shortly after the container is picked up it is secured to the pick up member, for instance with a clamp over the pick up cam. The clamp is put into and out position when it passes certain points along the path of the endless carrier, which is a system known per se with refuse container loading devices.

Also a receiving member is provided, which is mounted beneath the upper horizontal part of the path of the pick up member and which is in downward direction at least partly funnel-shaped. The receiving member extends from one side of the loading device to the other side thereof, where it connects to the usual receiving section of the refuse vehicle.

In order to ensure that the cover of the container is only then released when the container is directly above the receiving member, the invention provides that at the upper bends in the path of the endless carrier guides for a cover of the container are mounted, extending from where the tilting starts to outside of the receiving member. With these guides the cover of the container is guided from a closed position to a totally opened position and back to a closed position before reaching the next tilting phase of 180°.

These guides also enable to operate the device in a clockwise direction as well as in a anti-clockwise direction.

According to a preferred embodiment of the invention it is provided that the tilting means consists of rolls on the pick up member, one at either side of its pivot point, a protruding part of the pick up member at a distance from the pivot point parallel to the pivot axis of the pick up member, which lies against the endless carrier along the vertical parts of the path thereof, and guides for the rolls and the protruding part of the pick up member which are mounted symmetrically with a vertical

plane of symmetry intersecting the plane of the endless carrier perpendicular in the middle, whereby the guides for the protruding part are destined to tilt the pick up member from a normal or tilted position to an overturned position or vice versa and the guides for the rolls to tilt the pick up member from an overturned position to an inverted position or vice versa.

With this embodiment the top of the container is already above the receiving member when the container is only just slightly tilted, so that the danger exists of refuse dropping besides the receiving member.

To increase the stability of the system it is provided that further supporting means are provided consisting of a roll between the pick up member and the endless carrier, rotatable around the pivot axis of the pick up member, a supporting beam therefor and an U-shaped guideway for the end of the attachment member or members, protruding at the other side of the endless carrier, the supporting beam and the U-shaped guideway extending at least along the greater part of the upper horizontal part of the path of the endless carrier.

This together with an endless carrier consisting of two endless chains, running in parallel planes and connected to each other with the protruding part or parts of the attachment member or members, provides that the movement of the container along the path of the endless carrier is very well controlled and that no dangerous swaying of the container in any position can occur.

Because the system is totally symmetrical it can be operated in a clockwise as well as in a anti-clockwise direction.

The invention also provides that the wall of the receiving member has at least one detachable part. Herewith it remains possible to collect refuse offered in any other way than in containers for example in bags, boxes or as big, separate items, whereby the refuse can be brought into the refuse vehicle at the usual height for this way of collecting refuse.

With the device according to the invention it is also possible to collect separated refuse, for example in a organic and a non-organic component at the same time.

A first possibility is to mount two loading devices next to each other, whereby each receiving member connects to its own compartment of the refuse vehicle. Herewith the number of pick up members per loading device have to be taken into account, and also a coupling between the two endless carriers of the devices has to be made, in order to let the different containers pass each other safely.

Another possibility is to provide a movable slide in the receiving member, which is suited for a

system with a vertical separation or a system with a horizontal separation with control means to bring the movable slide in the correct position for each container. A simple embodiment hereof is a manual operated control system with control means in different colours corresponding to the colour of the different containers.

The invention also provides in a cleaning device for containers which comprises a reservoir for a cleaning liquid, a number of spray nozzles directed upwardly, means to spray under pressure the cleaning liquid and receptacle for the used cleaning liquid.

This cleaning device can be put through the detachable part or parts in the wall of the receiving member into the receiving member and partly into the refuse vehicle.

Because of the increase in the number of containers that can be handled in a day with the device according to the invention, a number of refuse vehicles normally used can now be used as cleaning vehicle for containers.

With respect to most of the existing cleaning methods for containers, whereby the used cleaning liquid is generally discharged on to the street, the cleaning device according to the invention means a considerable improvement, which will meet the environmental demands to be expected in the future.

The invention is elucidated in the following on hand of the drawing, in which

fig. 1 shows a back view of a refuse vehicle with a device according to the invention without the receiving member;

fig. 2 shows a back view of a refuse vehicle with a device according to the invention with the receiving member;

fig. 3 shows a side view of the refuse vehicle of fig. 2;

fig. 4 shows a side view of a refuse vehicle with another embodiment of the loading device;

fig. 5 shows schematically the various tilted positions of the pick up member;

fig. 6 shows schematically a side view of the pick up member in an inverted position, and

fig. 7 shows a side view of a refuse vehicle with a device according to the invention provided with a cleaning device.

In fig. 1 a refuse vehicle is indicated with 1 whereto a framework 2 with an interposed framework 3 is mounted.

At the angular points of framework 2 sprocket wheels 4,5,6,7 are mounted, around which an endless chain is put, whereby one of the sprocket wheels, in the drawn example sprocket wheel 5, is provided with a driving member, which can be an hydraulic motor.

One or more pick up members 10 are attached to the chain 8. In fig. 1 one pick up member is

indicated, but a framework of that size will operate in most cases at its best with four pick up members.

The pick up member 10 is attached to chain 8 in such a way, that the pick up member can move with respect to the chain parallel to plane wherein the chain 8 lies. Herewith the pick up member 10 pivots about a shaft 17, located at some distance from the chain 8.

The pick up member 10 has a pick up cam 11 at some distance of the plane wherein the chain 8 lies, intended to engage the pick up strip 12 of a container 13, whereby also a support arm 14 is provided, which abuts against the side of the container 13 when the container 13 is taken along with the pick up member 10.

Further at a smaller distance from the plane wherein chain 8 lies, the pick up member has tilting rolls 15,16, which are mounted at each side and at the same distance of the pivot axis 17 of the pick member 10.

The tilting rolls 15,16 are intended to cooperate with tilting bosses 18,19 mounted on the sprocket wheels 4,5, whereby tilting roll 15 engages with boss 19 and tilting roll 16 engages with boss 18. Regardless whether the endless chain 8 runs in a clockwise or anti-clockwise direction.

When the pick up member 10 reaches the upper part of a vertical part of the path, a tilting roll 15,16 engages a tilting boss 18,19 and the tilting movement is started with the further movement of the chain 8.

When the pick up member with the container 13 reaches a vertical position, the tilting 15,16 has not yet reached the highest point of the boss 18,19, so that the tilting continues and the pick up member 10 with the container 13 goes through the vertical position.

Between the bosses 18,19 a guide 20 for the tilting rolls 15,16 is mounted, which has a lower course near the tilting bosses 18,19 than in the central part of the guide 20 where the pick up member is moved in a vertical position.

In fig. 2 the receiving member is indicated with 27, which is more or less funnel-shaped, seen from the back as well as from aside, and connects to the usual receiving space in the refuse vehicle. In the backwardly directed side of the receiving member 27 doors 28 are mounted, through which other refuse then offered in containers, can be brought into the receiving space of the refuse vehicle without much effort.

Further guides for the container 13 are provided.

In fig. 3 the two guides 21,22 are indicated, which support the housing 23 of the container 13 with the guide 21 being mounted on the edge of the receiving member 27. The guides 21,22 en-

gage the rims of the housing 23 of the container 13 at the moment the tilting movement starts.

A guide for the cover 26 of the container is provided, which is mounted near the upper corner point between the guides 21,22 for the housing 23 of the container. The cover 26 also engages this guide at the moment that the tilting movement starts. The guide runs obliquely downwards at the position where the container is entirely above the receiving member, so that the cover may pivot open. At the other side of the receiving member 27 the cover runs along an identical guide only in opposite direction as a result of which the cover closes again.

The guide may be formed from a part of the sidewall of the receiving member, that runs sufficiently oblique in the direction of transport.

Fig. 4 shows another embodiment of the device according to the invention. The endless carrier consists of two endless chains 8,8', which run over sprocket wheels 4,4',5,5',6,6',7,7'. The pick up member 10 is attached to the two chains 8,8' by means of an attachment member 29, which also fixedly connects the two chains to each other. The combination of two chains 8,8', pairs of sprocket wheels and an attachment member 29 that connects the chain, ensure a very stable suspension and pivot point for the pick up member 10.

Besides the usual parts as cam 11 and support arm 14 the pick up member 10 further comprises a mounting plate 32, rolls 30,31, an extension part 33, in fig. 4 downwardly directed, and a protruding arm 34. The parts 11,14,32,33,34 form a rigid construction which is pivotable around the protruding part of the attachment member 29.

The rolls 30 and 31 are mounted at each side of the mounting plate 32. These rolls 30,31 and the protruding arm 34, which is located at the opposite side of the pivot point with respect to the rolls 30,31, form together with the guides 35-38 inclusive the tilting means for the pick up member 10.

The protruding arm 34 extends parallel to the pivot axis till near the chain 8' in the rear. During the vertical parts of the path of the endless carrier the protruding arm 34 abuts against chain 8. Near the upper corner points guideways 35,38 are mounted for the protruding arm 34. The lower ends of these guideways are partly located between the sprocket wheels 4,4' and 5,5'.

Between the upper sprocket wheels 4,4' and 5,5' guides 36 and 37 are mounted for the rolls 30 and 31 respectively.

Fig. 5 shows schematically the movements of the pick up member along the path of the endless carrier. The tilting movement starts when the attachment member 29 reaches the upper sprocket wheel 4 or 5, where the vertical movement changes in a horizontal movement along the path of the

chains, while the protruding arm continues the vertical movement, lying against the vertical part of chain 8.

When the protruding arm 34 reaches the guideway 35 the movement of the protruding arm changes to a combined vertical and horizontal movement, resulting in an overturned position of the pick up member 10.

Before the protruding arm 34 gets out of engagement with the guideway 35, the rolls 30 and 31 engage the guides 36 and 37 respectively, continuing the tilting movement till the pick up member 10 and therewith the container 13 reach an inverted position.

At the end of the guides 36,37 the tilting movement starts again, now from an inverted position to an overturned position and with the protruding arm 34 in engagement with the guideway 38 from an overturned position to a tilted position, and finally at the other vertical side of the endless carrier after going through an angle of 360°.

At the downwardly directed side of the endless carrier after leaving the guideway 38 the protruding arm 38 also prevents the pick up member 10 with the container 13 from swaying against the receiving member 27.

Fig. 6 shows schematically a side view of the pick up member 10 in an inverted position, without the pick up cam 11 and the supporting arm 14.

The attachment member 29 is fixedly connected to the chains 8, 8' by means of plates 39-42. To one end of the attachment member 29, at the left side in the drawing, a roller 43 is fitted, which runs in a U-shaped runway 44.

Between the chain 8 and the mounting plate 32 another supporting roller 45 is mounted which runs over a guide 46.

The assembly of these rollers and guides provides a very stable pivot point for the pick up member 10, which is of particular importance for the part of the path of the endless carrier where the pick up member pivots. Consequently these guides are mounted along the greatest part of the upper horizontal path.

A roller 47 is fitted to the protruding arm 34, made of nylon for example, which is to run in the guideways 35, 38.

The attachment member 29 has the shape of a crankshaft, with the crank located between the two chains 8, 8'. This construction prevents the attachment member from engaging the guides 35, 38 for the protruding arm 34.

Finally fig. 7 shows the device according to the invention with a cleaning device mounted in the receiving member 27, so that the refuse vehicle may now be used as a cleaning device for containers.

The cleaning device, which can be mounted

after the door or doors 28 are removed from the receiving member 27, comprises a reservoir 24 for a cleaning liquid, a receptacle 25 to receive used liquid and a pump 50 to wash out the containers with cleaning liquid through one or more spray nozzles 51. A grid 52 may be mounted above the receptacle 25 for used cleaning liquid to retain possible residual refuse from the containers.

Claims

1. Loading and emptying device for a refuse vehicle comprising an endless carrier, running in a substantially vertical plane, one or more pick up members attached to the endless carrier and tilting means for tilting a container, **characterized in that**, the pick up member or pick up members (10) are pivotable around an attachment member or members (29), attaching the pick up member or members (10) to the endless carrier (8, 8'), whereby the pivot axis are perpendicular to the plane of the endless carrier and that tilting means are provided in such a way that the pick up member or members (10) turn through an angle of 360° along the path of the endless carrier (8, 8').
2. Device according to claim 1, **characterized in that**, the path of the endless carrier (8, 8') has two vertical and two horizontal parts, whereby the tilting means are mounted in such a way that at the angular points between the upper horizontal part and the two vertical parts the pick up member or members (10) are turned through an angle of 180° or more.
3. Device according to claim 2, **characterized in that**, a receiving member (27) for the refuse is provided which, passing through the device, extends from one side of the device to the other side thereof into the refuse vehicle (1) and which is at least partly funnel-shaped.
4. Device according to claim 2-3, **characterized in that**, the tilting means consists of a boss (18, 19) in each of the corners between the upper horizontal and the two vertical parts of the path of the endless carrier (8, 8') and two rolls (15, 16) mounted on the pick up member (10) on either side of the pivot point thereof, whereby the respective rolls (15, 16) engage the respective bosses (18, 19) with the movement of the pick up member (10) through the upper bends of the path of the endless carrier (8, 8').
5. Device according to claim 4, **characterized in that**, between the bosses (18, 19) a guide (20)

is mounted for the rolls (15, 16) on the pick up member or members (10).

6. Device according to claim 4-5, **characterized in that**, two parallel guides (21, 22) for a container are provided, which extend from where the tilting starts to where the tilting is completed.
7. Device according to claim 4-6, **characterized in that**, at the upper bends in the path of the endless carrier (8, 8') guides for a cover (26) of the container (13) are mounted, extending from where the tilting starts to outside of the receiving member (27).
8. Device according to claim 2-3, **characterized in that**, the tilting means consists of rolls (30, 31) on the pick up member (10), one at either side of its pivot point, a protruding part (34) of the pick up member (10) at a distance from the pivot point parallel to the pivot axis of the pick up member (10), which lies against the endless carrier (8, 8') along the vertical parts of the path thereof, and guides (36, 37) for the rolls (30, 31) and the protruding part (34) of the pick up member (10) which are mounted symmetrically with a vertical plane of symmetry intersecting the plane of the endless carrier (8, 8') perpendicular in the middle, whereby the guides (35, 38) for the protruding part are destined to tilt the pick up member (10) from a normal or tilted position to an overturned position or vice versa and the guides (36, 37) for the rolls (30, 31) to tilt the pick up member (10) from an overturned position to an inverted position or vice versa.
9. Device according to claim 8, **characterized in that**, further supporting means are provided consisting of a roll (45) between the pick up member (10) and the endless carrier (8, 8'), rotatable around the pivot axis of the pick up member (10), a supporting beam (46) therefor and an U-shaped guideway (44) for the end of the attachment member (10) or members, protruding at the other side of the endless carrier (8, 8'), the supporting beam (46) and the U-shaped guideway (44) extending at least along the greater part of the upper horizontal part of the path of the endless carrier (8, 8').
10. Device according to one or more of the preceding claims, **characterized in that**, the endless carrier (8, 8') consists of two endless chains (8, 8'), running in parallel planes and connected to each other with the protruding part or parts of the attachment member or

members (29).

11. Device according to claim 3, **characterized in that**, the wall of the receiving member (27) has at least one detachable part (28). 5
12. Cleaning device for containers comprising a device according to one or more of the preceding claims, **characterized in that**, it further comprises a reservoir (24) for a cleaning liquid, a number of spray nozzles (51) directed upward, means (50) to spray under pressure the cleaning liquid, a receptacle (25) for the used cleaning liquid and that the device fits in the receiving member (27) through the detachable part (28) thereof. 10 15

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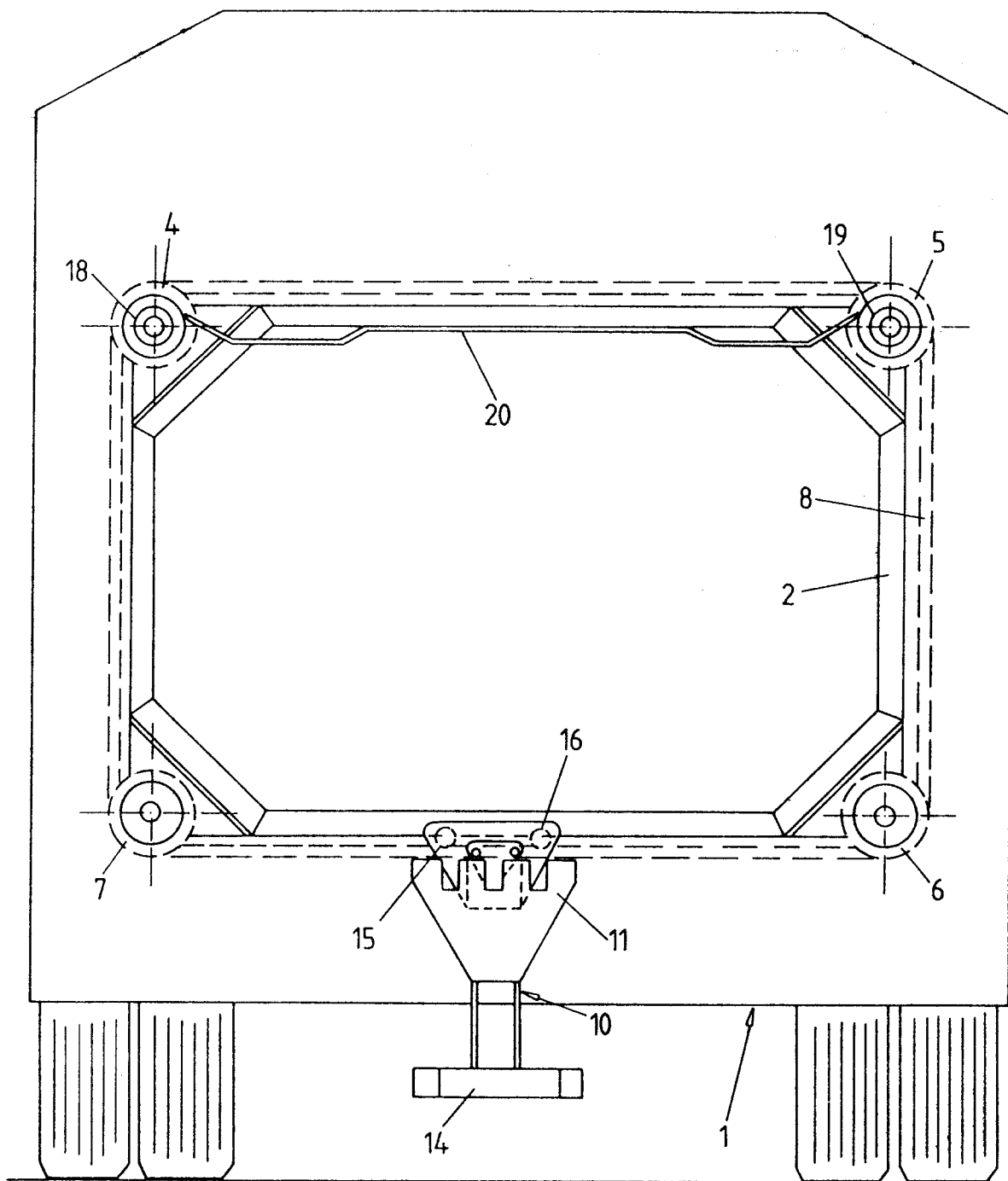


FIG. 1

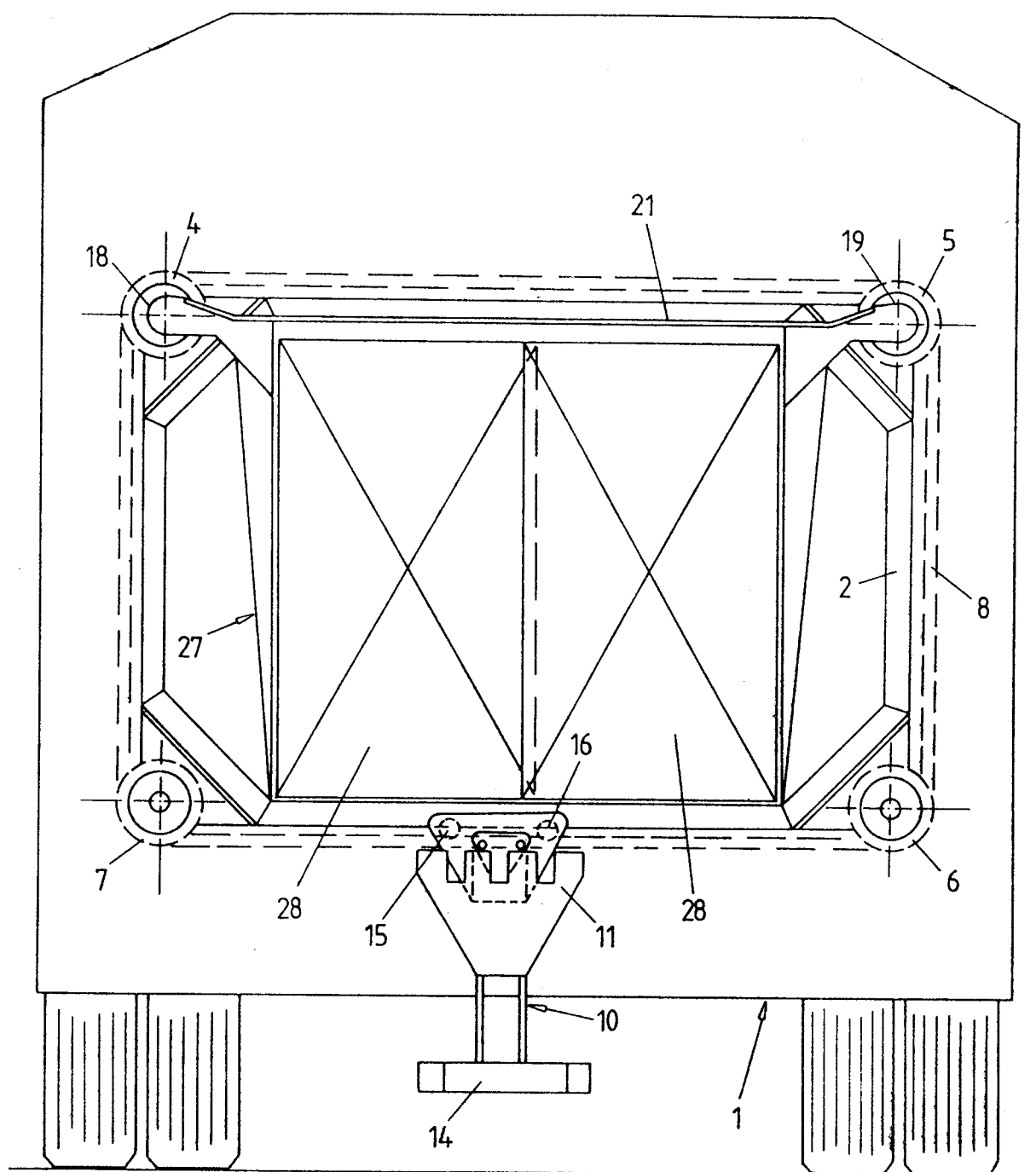


FIG. 2

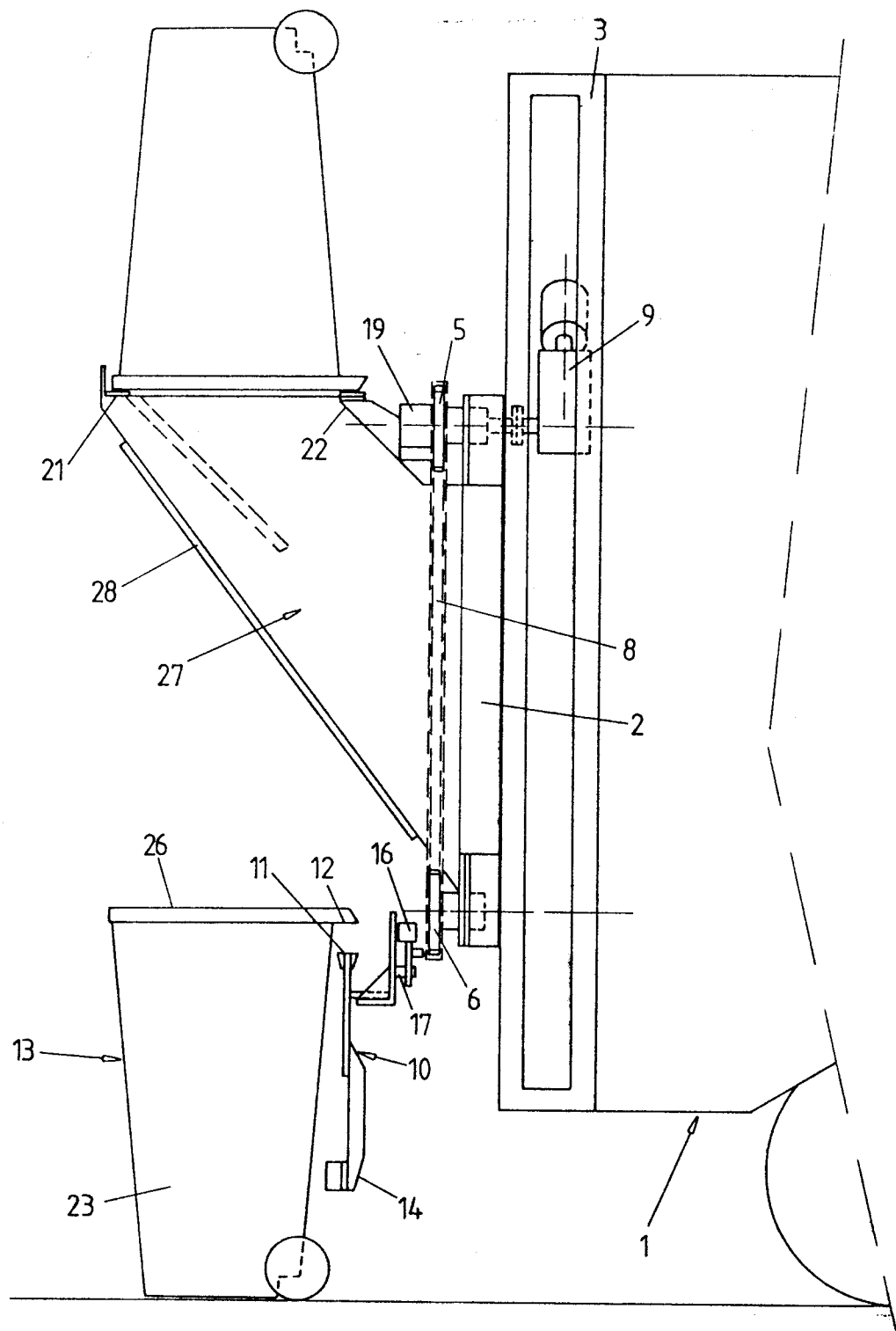


FIG. 3

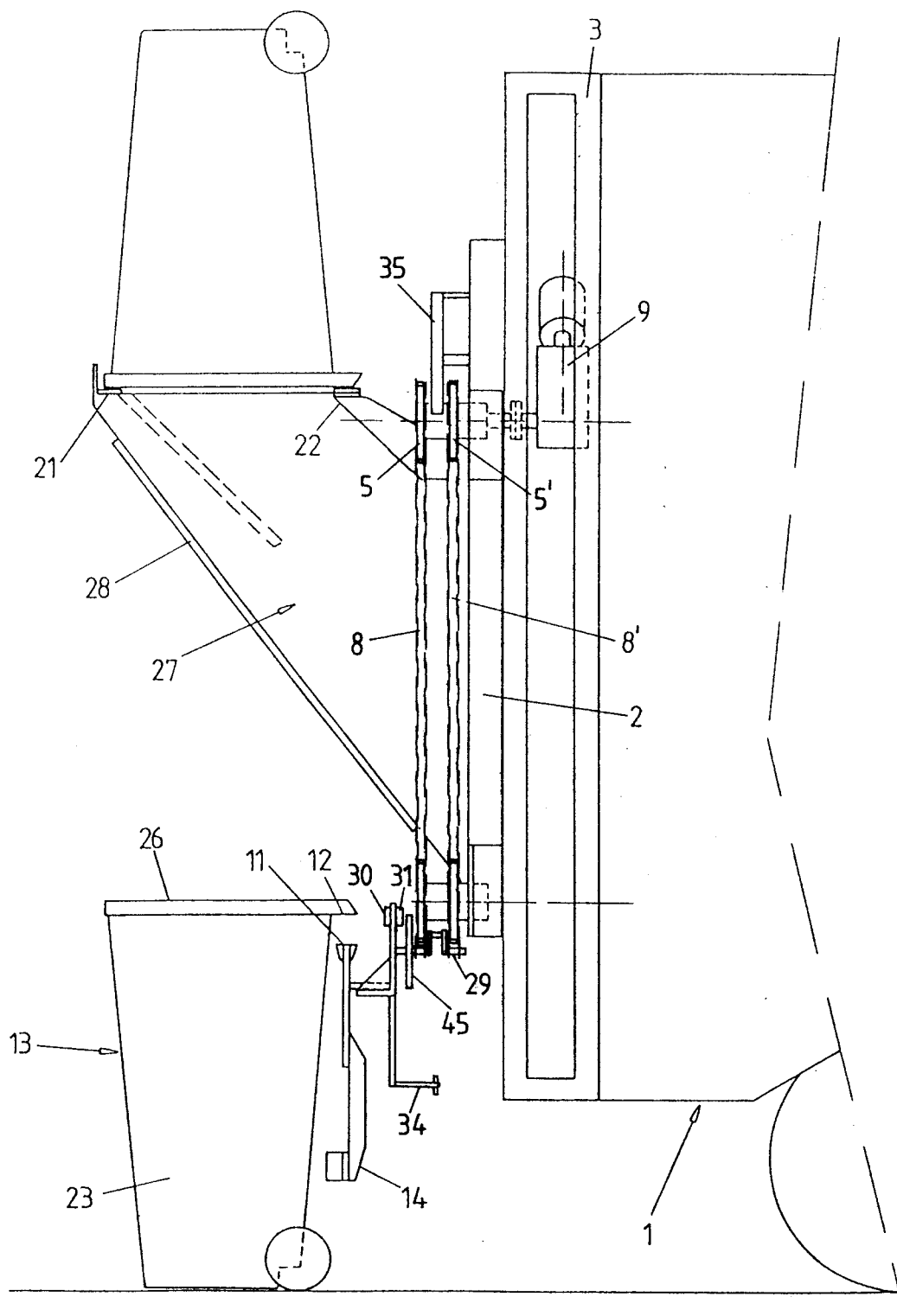


FIG. 4

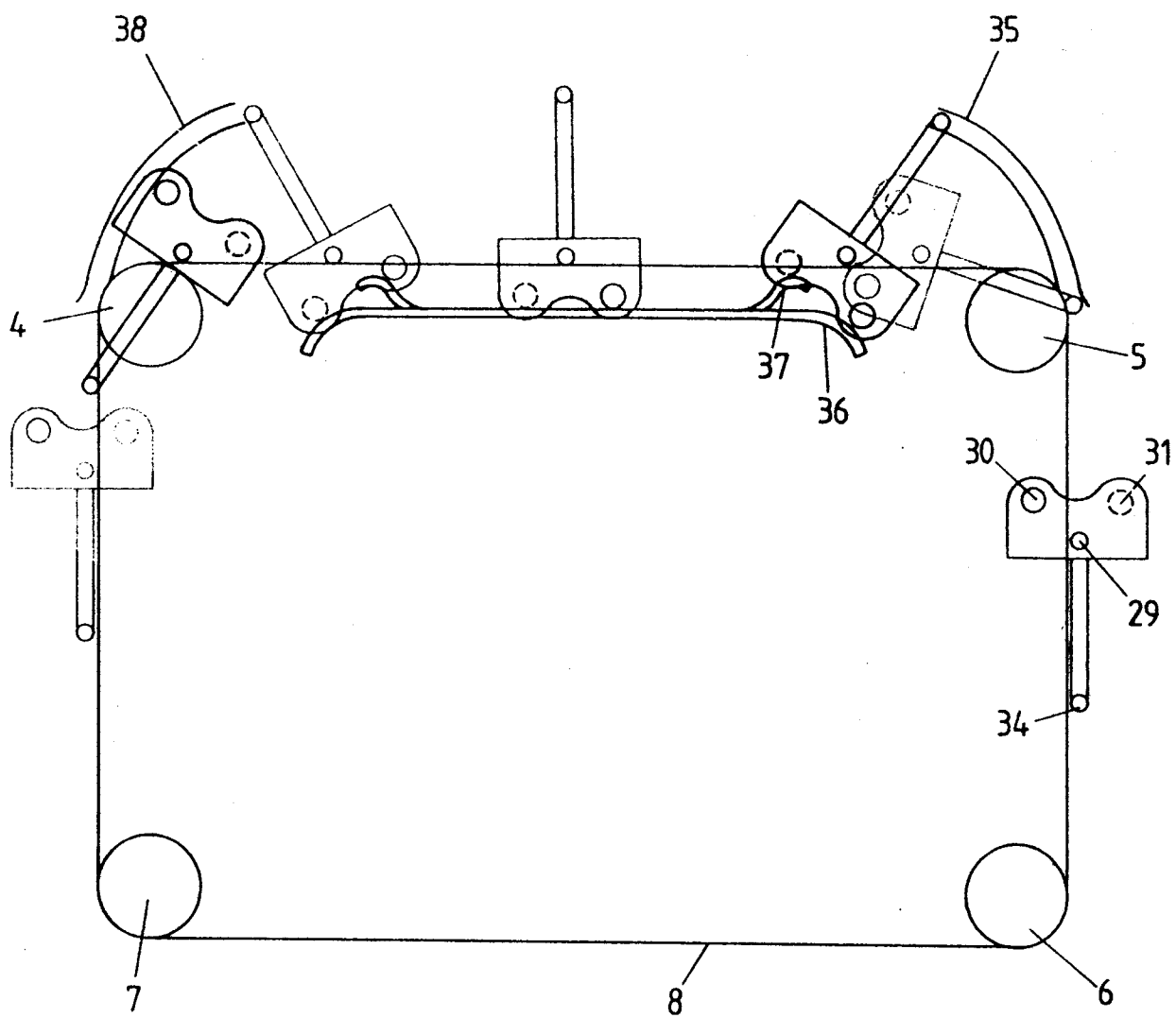


FIG. 5

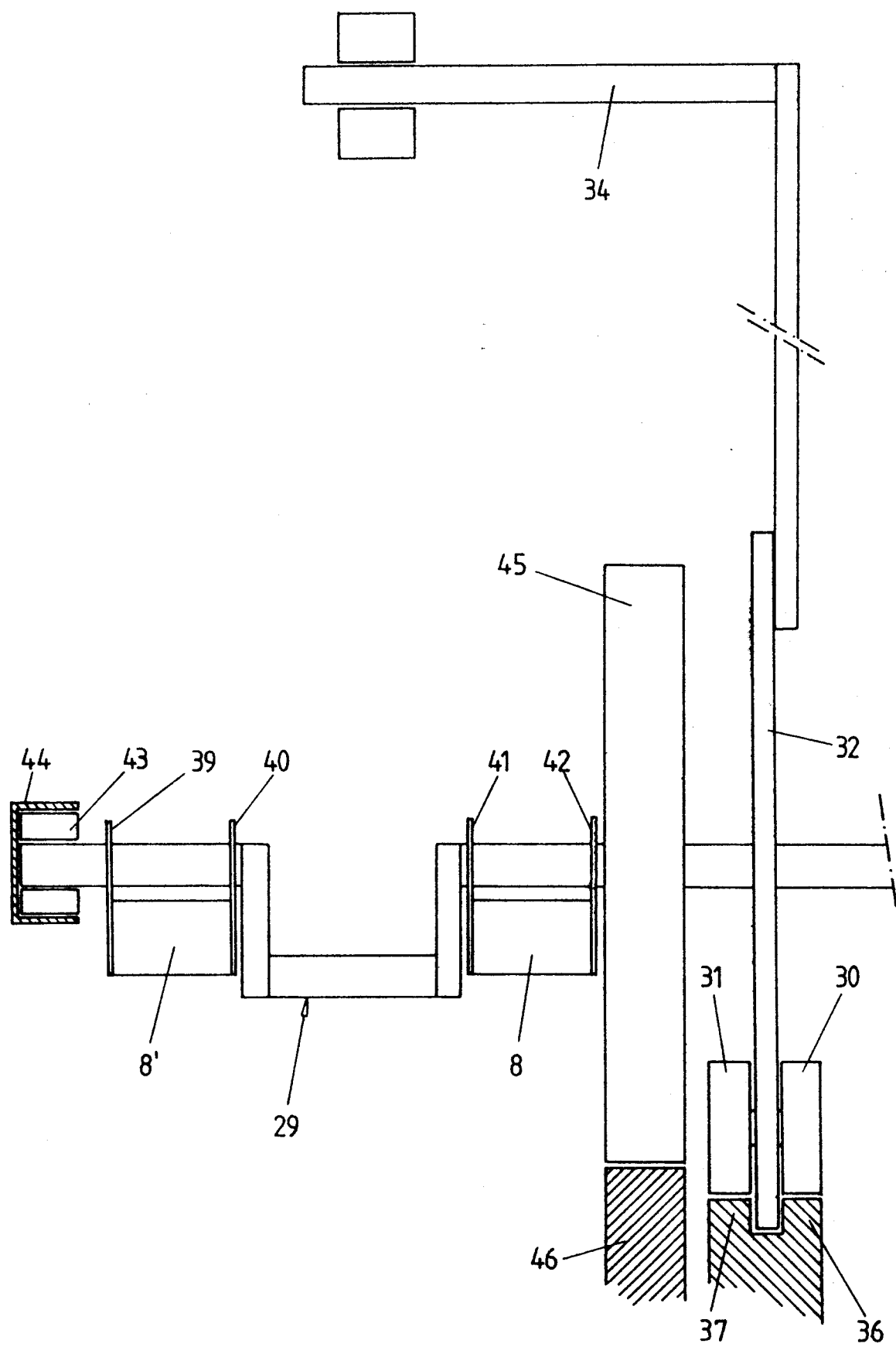


FIG. 6

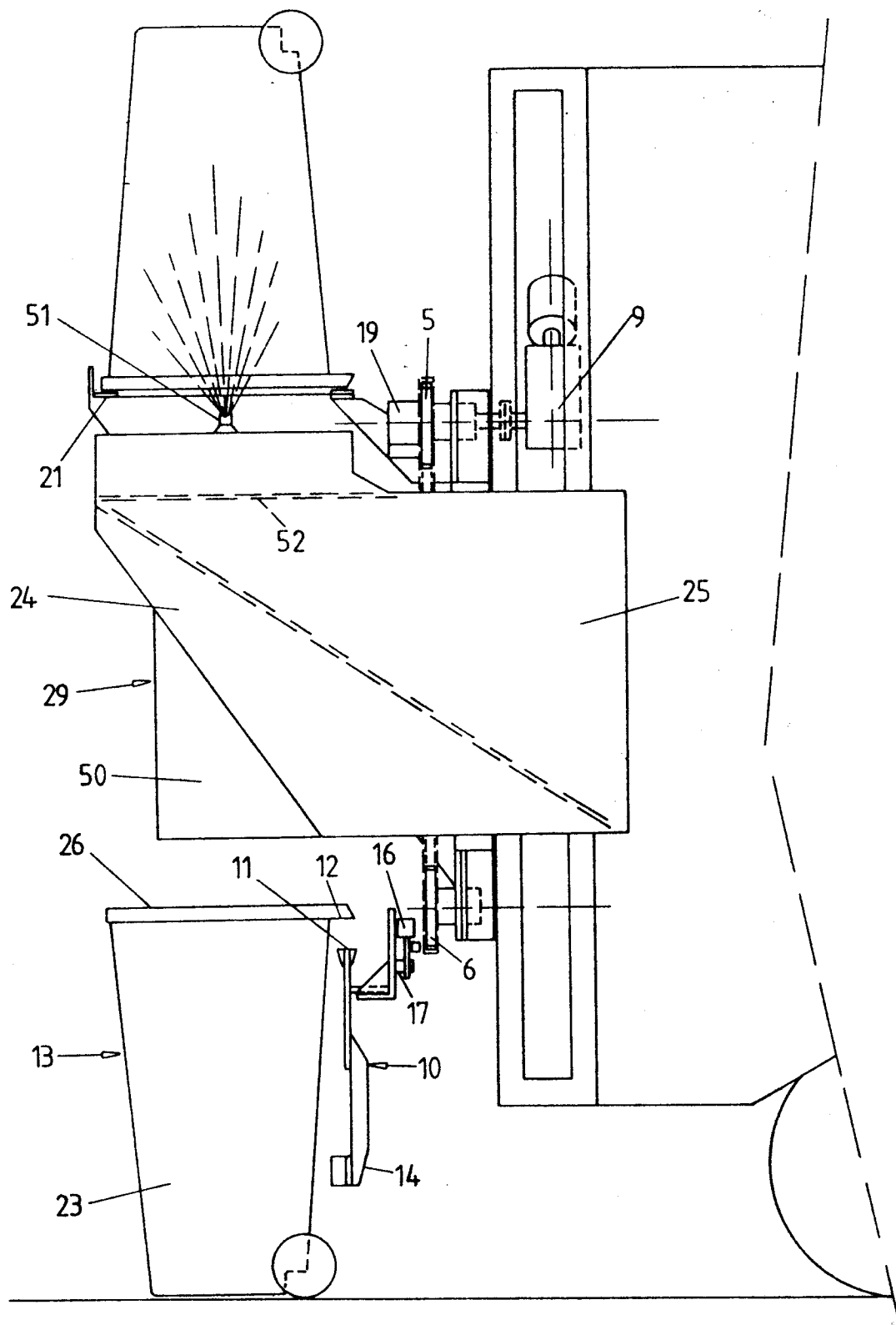


FIG. 7



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EUROPEAN SEARCH REPORT

Application Number

EP 91 20 1698

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
D,A	DE-C-432 470 (HENNECKE)the whole document - - -	1,12	B 65 F 3/08
D,A	US-A-4 219 298 (STRAGIER ET AL.) - - -		
D,A	US-A-4 090 626 (EBELING ET AL.) - - - - -		
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B 65 F
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of search 08 October 91	Examiner DEUTSCH J.P.M.
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