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(54) **Lifting and tipping device for dustbins**

(57) The lifting and tipping device for dustbins is operated by a set of cylinders (2,3) that cause a shaft (5) to turn by way of a rack and pinion system, said shaft in turn turns pulleys (6) which raise a beam (10) and/or drive arm by means of a chain (15). Since these pulleys have a pin (14) fixed to them which, as they turn, runs along the inside of a groove (12) machined in the side

parts (7) attached to these pulleys; when this pin reaches the end of the groove, firstly the tipping arm and then the drive beam and the pushing system start to turn and, as the dustbin is fixed to them, it is tipped and then the movement in the opposite direction takes place.

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Description

OBJECT OF THE INVENTION

[0001] The object of the present invention is a dustbin lifter-tipper from amongst the devices or mechanical assemblies with the function of first lifting and then tipping dustbins so as to dump their contents inside a hopper attached to a refuse collection truck or the like, such as waste incineration equipment, static compactors, etc.

[0002] The present invention is characterised by its universal nature as it can be adapted to any of the hopper systems available on the market.

[0003] On the other hand, thanks to the present invention it is possible to achieve a linear lifting movement and a turn by means of acting on a tipping shaft by means of a single pair of ram cylinders.

[0004] The present invention is also characterised by the special arrangement and design of the parts and elements involved in the final conformation of the lifter-tipper assembly, with the result that the number of operations to be performed in the handling of the dustbins is successfully reduced.

[0005] The present invention is therefore confined within the bounds of dustbin lifting and tipping devices adapted to hoppers installed on trucks or the like, such as incinerators or static compactors, etc.

BACKGROUND OF THE INVENTION

[0006] Up to the present time dustbin lifting and tipping devices have followed a given sequence of actions. These actions would be as follows, starting from a position in which the assembly is ready to receive the bin.

- Take hold of the bin.
- Raise the assembly.
- Tip.
- Withdrawal from the preceding tip.
- Lowering of the assembly.
- Removal of bin.
- Raise the assembly, this action being necessary as the assembly for taking hold of and withdrawing the bin has lowered so much that it is not possible for the truck to travel with the assembly down.
- Upon arriving at the next bin pick-up point, it would be necessary to lower the assembly to receive the new bin.

[0007] As may be observed the number of operations that have to be performed in each cycle is quite high. Owing to the fact that the truck cannot be driven with the lifting and tipping assembly in the bin reception and removal position, as this position is too low, it means that to receive the bin the assembly has to be lowered and then raised again, to remove the bin the assembly has to be lowered and then finally raised, because it is not possible for the truck to be driven off with the lifting and

tipping assembly in such a low position.

[0008] In other words, the distance between the beam and/or arms and the bin "pushing" system is constant, which means that, when the beam lowers to leave the bin on the ground, the distance from this pusher or "pushing" system to the ground is very small, preventing the forward movement of the truck. However, what is achieved now with the present invention is that the distance between the beam and the "pushing" system is variable, being minimum when the beam is down so as to attach or detach the bin and maximum when the beam is up, providing a favourable support for the pin during tipping, so that the beam assembly and "pushing" system does not have to be lowered to be able to install or remove the bin, with the result that, if it is not raised beforehand, it is impossible for the truck to move off.

DESCRIPTION OF THE INVENTION

[0009] The dustbin lifter-tipper that is the object of this invention enables it to be adapted to refuse collection trucks as well as to waste incinerators, static compactors, etc., i.e. it is not confined merely to the sphere of refuse trucks.

[0010] The lifter-tipper comprises a beam and/or bin drive arms as well as a bin "pushing" system where the distance between both is variable, being maximum when the beam is up and minimum when the beam is down so as to attach or detach the bin after emptying. Thanks to this feature, in that the distance between the beam and/or arms and the "pushing" system is variable, the assembly is not so low when the bin is removed, so that it is possible for the truck to be driven without the assembly having to be raised.

[0011] This dustbin lifting-tipping assembly consists of a system operated by two sets of cylinders placed at the ends of the assembly. In their movement these cylinders act on a rack which, as it moves, turns a ring gear mounted on the ends of a shaft, in other words a rack and pinion system that transmits rotary movement to this shaft.

[0012] The lifter-tipper obtained is mounted on a frame and it may be adapted to any of the hopper systems available on the market today.

[0013] With the system by means of a single shaft on which it is operated, it is possible to obtain an initial linear lifting movement and then a rotary movement for tipping.

[0014] In the first place, the shaft turn causes a turning movement in the pulleys which are attached firmly to the ends of the shaft. Each of these pulleys is provided with a traction chain connected at its lower end to a beam and/or arms on which the dustbin is secured.

[0015] The turning of the pulleys and, as a result, the movement of the chains causes the beam and/or attach arms to rise towards the bin. This movement of the beam is a linear lifting movement.

[0016] When a given turning point is reached, a pin

provided on these pulleys, which first of all slides along the inside of a groove in the side pieces attached to the pulley, comes up against the end of the groove in the side pieces, which makes the whole shaft, pulley and side piece assembly turn, in which, as they turn, said side pieces act on the dustbin support beam, so that it is then tipped.

[0017] Having reached the maximum point of turn, i. e. of tipping, the ram cylinders act in the opposite direction to produce a turn the other way round, so that the bin is tipped back and when the side pieces attached to the pulley or tipping arms reach their vertical position, the turning of the pulley continues in the opposite direction as does that of the pin, which runs inside the groove in the side pieces, this action causes the linear lowering movement of the beam and/or bin attach arms.

[0018] In short, what is achieved with the present invention is that the distance between the beam and/or the arms and the bin pushing system is variable, minimum when the beam is down and maximum when the beam is up, providing a favourable support for the bin during tipping. The beam and/or arm assembly and the pushing system is raised far enough from the ground after removal of the bin that it is not necessary to proceed to raise said assembly in relation to the ground as this distance is sufficient for the truck to be driven off.

[0019] The final assembly obtained is compact and built into the actual hopper, which makes for smaller dimensions if mounted on the hopper of a truck.

[0020] As a constructional alternative, it is possible to achieve a lifter-tipper split into two halves, so that it is possible to work with one of the two halves separately.

DESCRIPTION OF THE DRAWINGS

[0021] To supplement the description being given and in order to assist clearer understanding of the features of the invention, in accordance with a preferred specimen practical embodiment of same, a set of drawings is attached as an integral part of said description, wherein the following most significant details are represented for illustrative and non-restrictive purposes:

[0022] Figure 1 shows a perspective view of the lifting and tipping assembly that is the object of the invention.

[0023] Figure 2 shows a detail view of the pulley and the pulley side enclosing parts.

[0024] Figure 3 shows one of the lifter-tipper arms, when the dustbin raising movement is about to start.

[0025] Figure 4 shows the same arm as above when the bin raising movement is completed and tipping is about to start.

[0026] Figure 5 shows a side view of the assembly with a bin attached.

[0027] Figure 6 shows a detail view of the part that acts not only as a connection between the traction chain and the transfer cable, but also as the bin drive beam retainer.

PREFERRED EMBODIMENT OF THE INVENTION

[0028] In the light of the figures a description is given below by way of a preferred embodiment invention proposed.

[0029] In figure 1 we observe that the dustbin lifter-tipper covered by this invention has a frame (1) on which the other components are fixed.

[0030] For its features this assembly is adaptable to any of the hopper systems available today.

[0031] Attached to this frame (1) we see that there are cylinders (2) and (3) attached at each one of the ends. The cylinders (2) are responsible for raising and then tipping, while the cylinders (3) carry out the turn in the opposite direction.

[0032] The conversion of the action on the cylinders (2) and (3) into a rotary movement is carried out by means of a mechanism (4), based on the movement of a rack which, being engaged with a ring gear, causes this to turn as it moves, and in the end the shaft (5).

[0033] At its ends the shaft (5) is fitted with pulleys (6), which are integral with the shaft. The pulleys are also provided with side pieces (7) which are attached at the bottom to tipping arms (8), which can turn freely in relation to the main shaft.

[0034] In the front face of the tipping arms (8) there is a groove (9) or guide machined along which run the pieces to which the beam (10) is attached at its ends. The groove (9) is lined with a material to prevent wear.

[0035] Lower support means (11) for the bins are attached to the underside of the tipping arms (8). These support means (11) are rollers that turn due to friction as the bin is raised and lowered, thus making this movement smoother.

[0036] The beam (10) carried out a linear lifting movement from the bottom end of the groove (9) up to the position shown, which is when the tipping arms, and therefore the beam, start to turn and draw the bin with them as they rotate.

[0037] In figure 2 we observe the relationship that there is between the pulley (6) which is firmly attached to the shaft (5), and the side pieces (7). Neither of the side pieces is linked and although they are supported by the shaft (5) they can turn in relation to the shaft.

[0038] The side pieces (7) are provided with a groove (11), where a pin (14) runs attached to the pulley, so that when the pin (14) reaches the end of the groove it takes the side pieces (7) with it as it turns.

[0039] In figure 3 we observe that the pulley (6) is provided with a pin (14) which runs along the groove (12) as the pulley turns.

[0040] We can also see the part (17) with the function on one side of connecting the traction chain (15) to the transfer cable (16). This part (17) is where the ends of the beam (10) and/or bin drive arms are attached.

[0041] The pulley (6) has a part (13) attached to it on which one end of the traction chain (15) is attached on one side and the transfer cable (16) at the other end.

[0042] When shaft (5) and therefore the pulleys (6) start to turn, the pin (14) begins to move away from the position shown, causing the part (17) where the drive beam (10) is attached to rise.

[0043] When the pin (14) reaches the end (18) of the groove (12), the action of the side pieces (7) and therefore of the tipping arms (8) takes place, so that the bin is tipped. This is the situation shown in figure 4, where the tipping of the assembly occurs.

[0044] In figure 5, besides the items already described, we observe how the beam (10) on which the bin (18) is secured is attached to part (17).

[0045] Lastly, in figure 6 we have a close view of the features of part (17). As already mentioned, this part is responsible not only for connecting the traction chain (15) to the transfer cable (16), but is also the one on which the beam (10) and/or bin drive arms are attached.

[0046] The top of the part (17) is provided with means (20) for fixing the drive chain (15), while on the inside it also has a wheel (21) that helps this part to slide inside the tipping arm (8) (figure 1). In order to assist its linear movement, it has an elongated part (21) which runs along the guiding groove (9) machined in the tipping arms (8), and it is on this part (21) where the ends of the drive beam (10) are attached.

[0047] Linked to the drive chain fastening means (20) there is a threaded rod at one end and this assembly acts as the means for adjusting the tension of the drive chain (15).

[0048] The essential nature of this invention is not changed by variations in materials, shape, size and layout of the component parts, described on a non-restrictive basis, as this would suffice for an expert to be able to reproduce it.

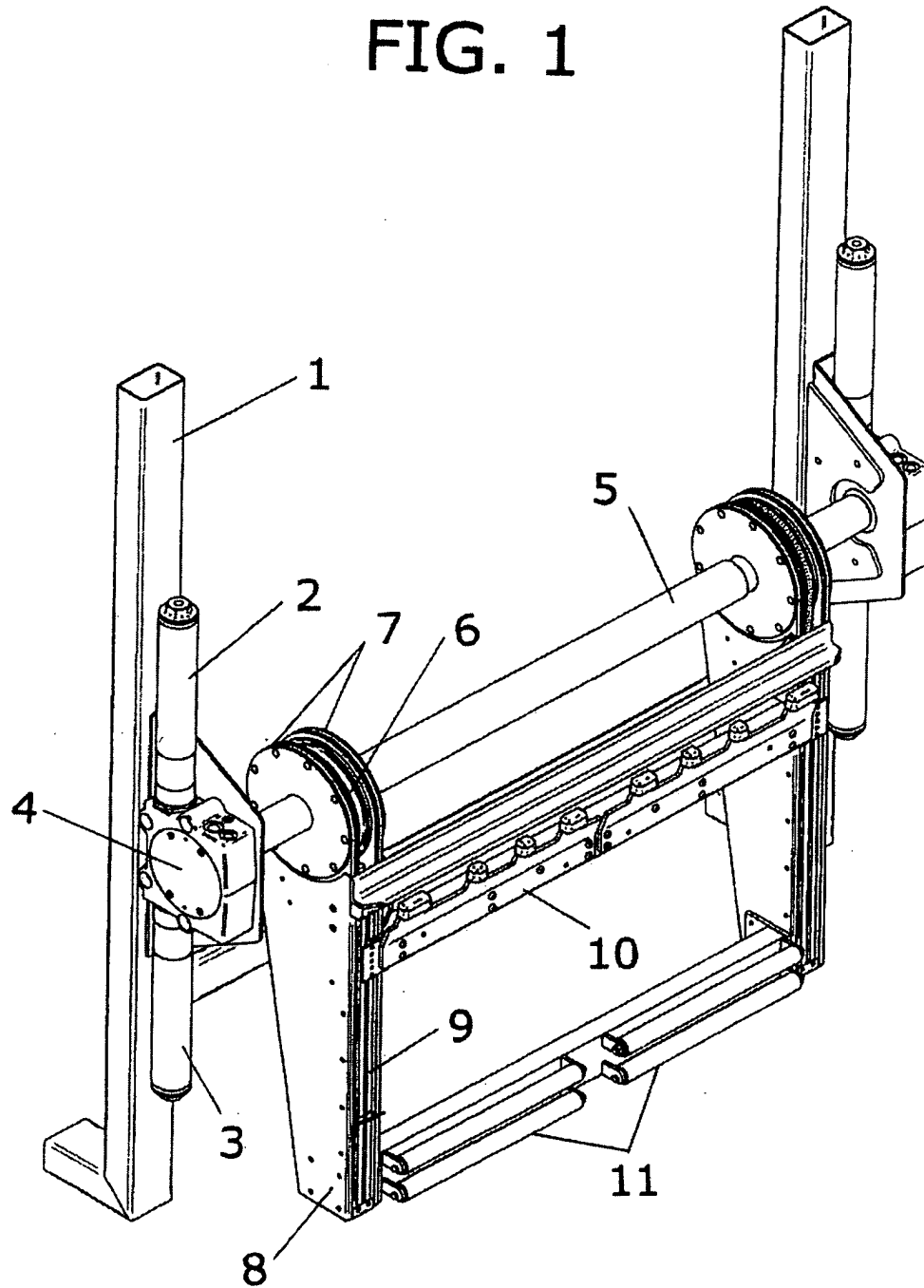
that the turn of the pulley (6) initially only produces the raising of the beam (10), while the bin tipping operation takes place when the pin has reached the end of the groove (12).

2. Dustbin lifter-tipper, as defined in claim 1, **characterised in that** traction on the beam (10) is brought about by means of a traction chain (15) and a transfer cable (16) on the pulley (6) of a part (13) attached to it on which is fastened one end of the chain (15) and of the transfer cable (16), while on the other side parts are joined at part (17) for this purpose, besides being the part on which the ends of the drive beam (10) are secured.
3. Dustbin lifter-tipper, as defined in claim 2, **characterised in that** the part (17) connecting the chain (15) and the transfer cable (16) is provided with means (20) for mounting the chain as well as a roller (21) that assists the internal sliding of the tipping arm (8), which also has a part (19) that runs along the inside of the groove (9) in the tipping arms and to which the ends of the drive beam (10) are attached; on the other hand, linked to the means (20) for fastening the drive chain (15) there is a threaded stem at its end, said assembly acting to regulate the tension of the chain (15) and the levelling of the beam and/or bin drive arms.
4. Dustbin lifter-tipper, as defined in any of the preceding claims, **characterised in that** the lifter-tipper assembly is split into two halves that enable either of the two halves to work separately on its own side.

Claims

1. Dustbin lift-tipper **characterised in that** it is built into the hopper of a refuse truck or on waste incinerators, compactors, etc., comprising a beam (10) and/or bin drive arms as well as a "pushing" system in which the distance between both is variable, being maximum when the beam is up and minimum when the beam is down to attach and detach the bin, being actuated by means of lifting and lowering cylinders installed at the ends which use a rack and pinion system to transmit a turn to the shaft (5) which first of all brings about the raising of the bin and then its tipping; at each end of the shaft (5) there are pulleys (6) installed that have side parts (7) attached at their sides to tipping arms (8) provided with a groove (9) along which runs the part (21) that forms part of the beam (10) drive part (17); the interaction between the pulley (6) and the side laminar parts (7) is by means of a pin (14) attached to the pulleys (14) and which runs along the inside of a groove (12) machined in these side parts (7), so

FIG. 1



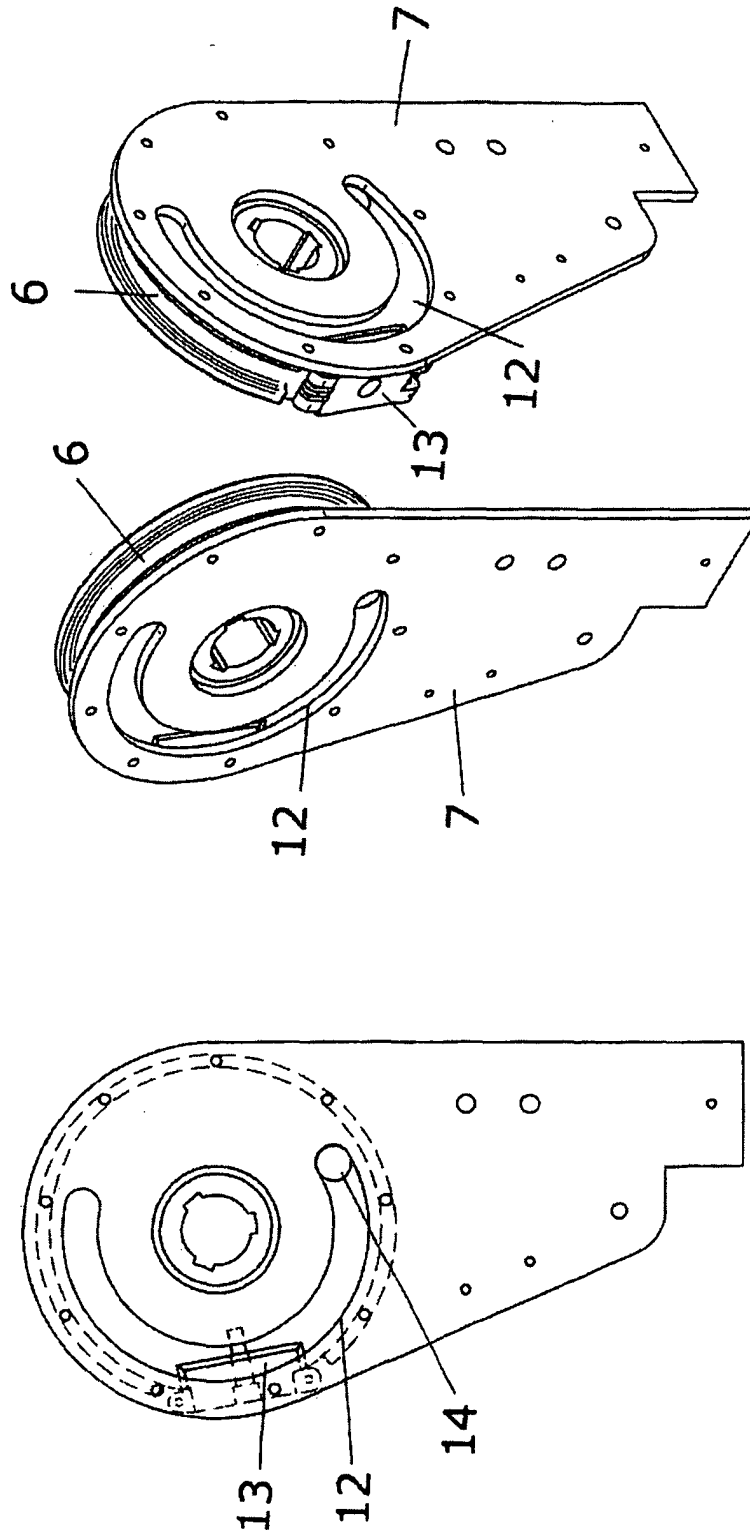


FIG. 2

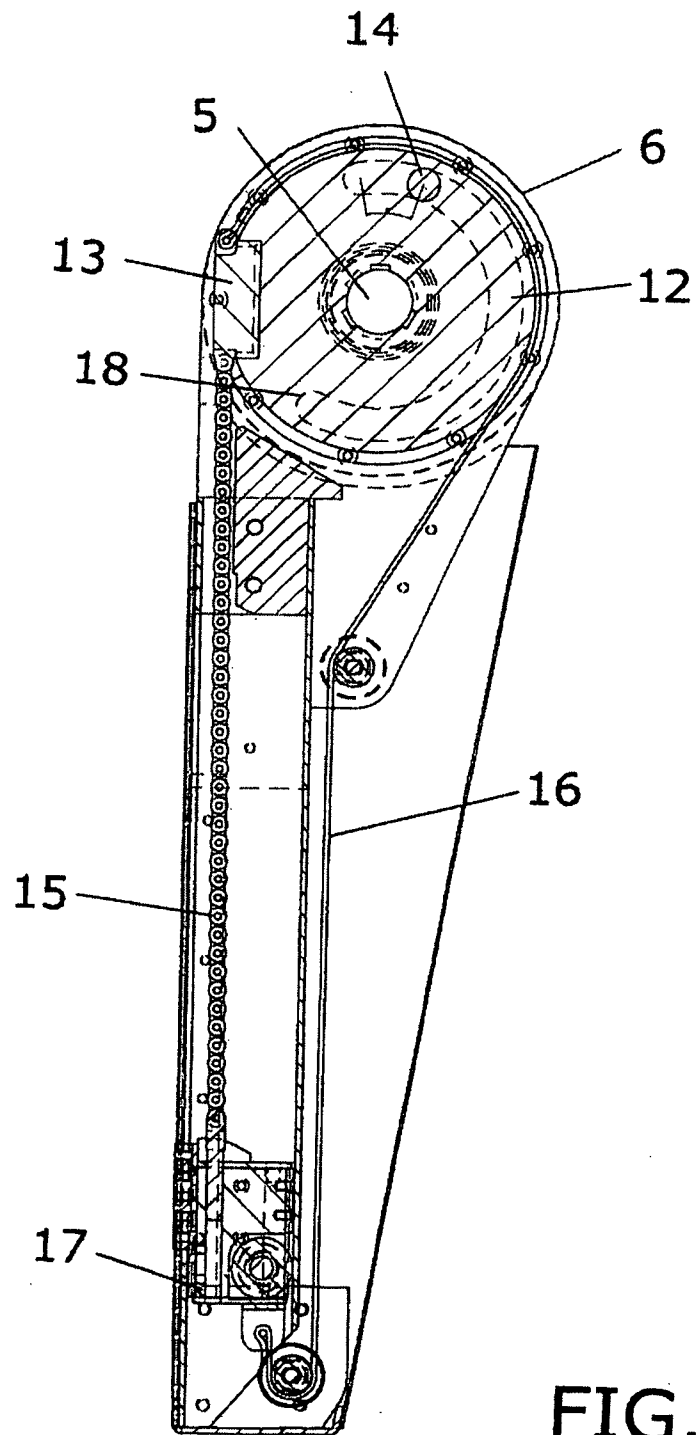


FIG. 3

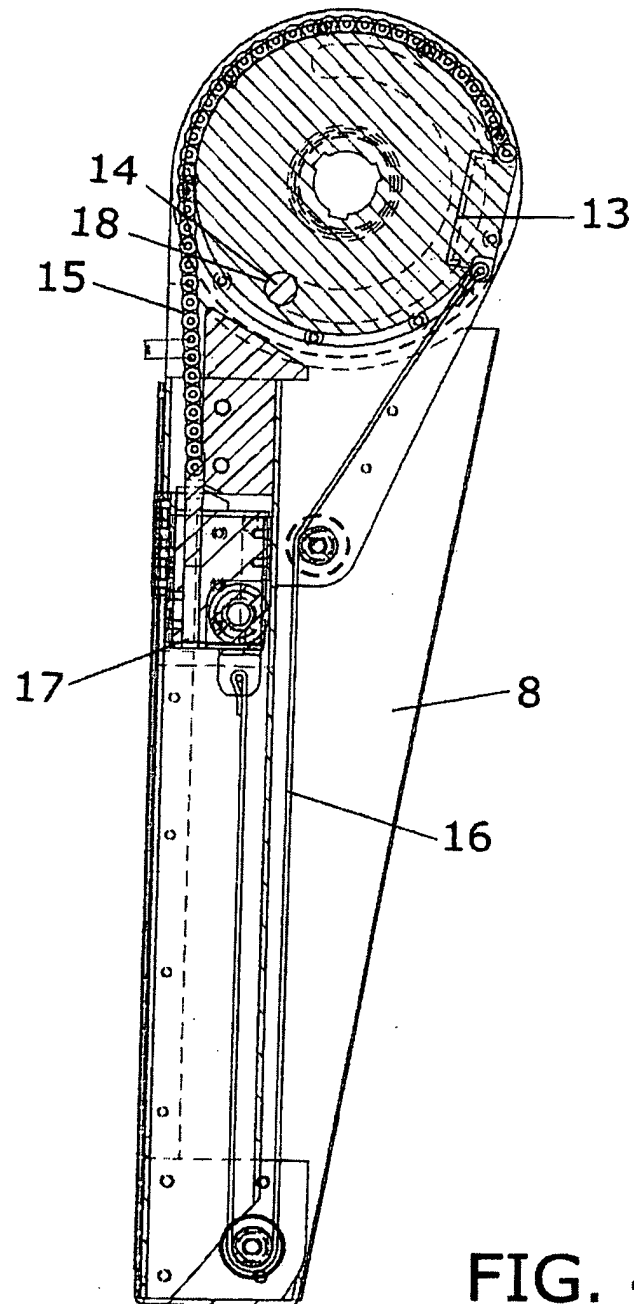
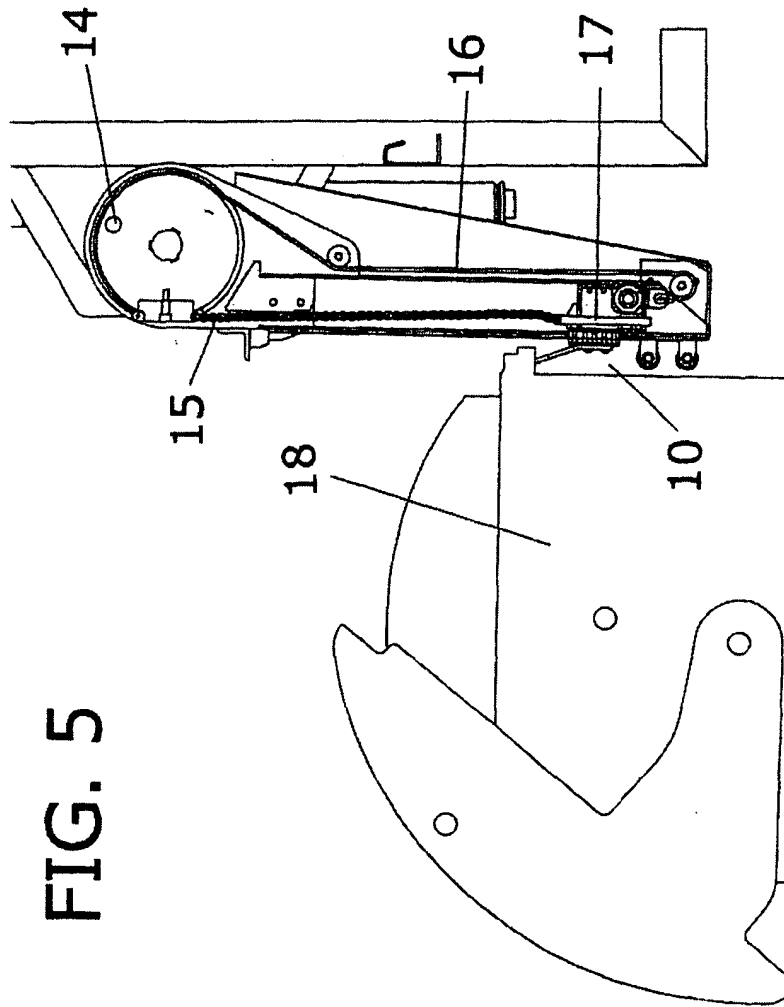


FIG. 4



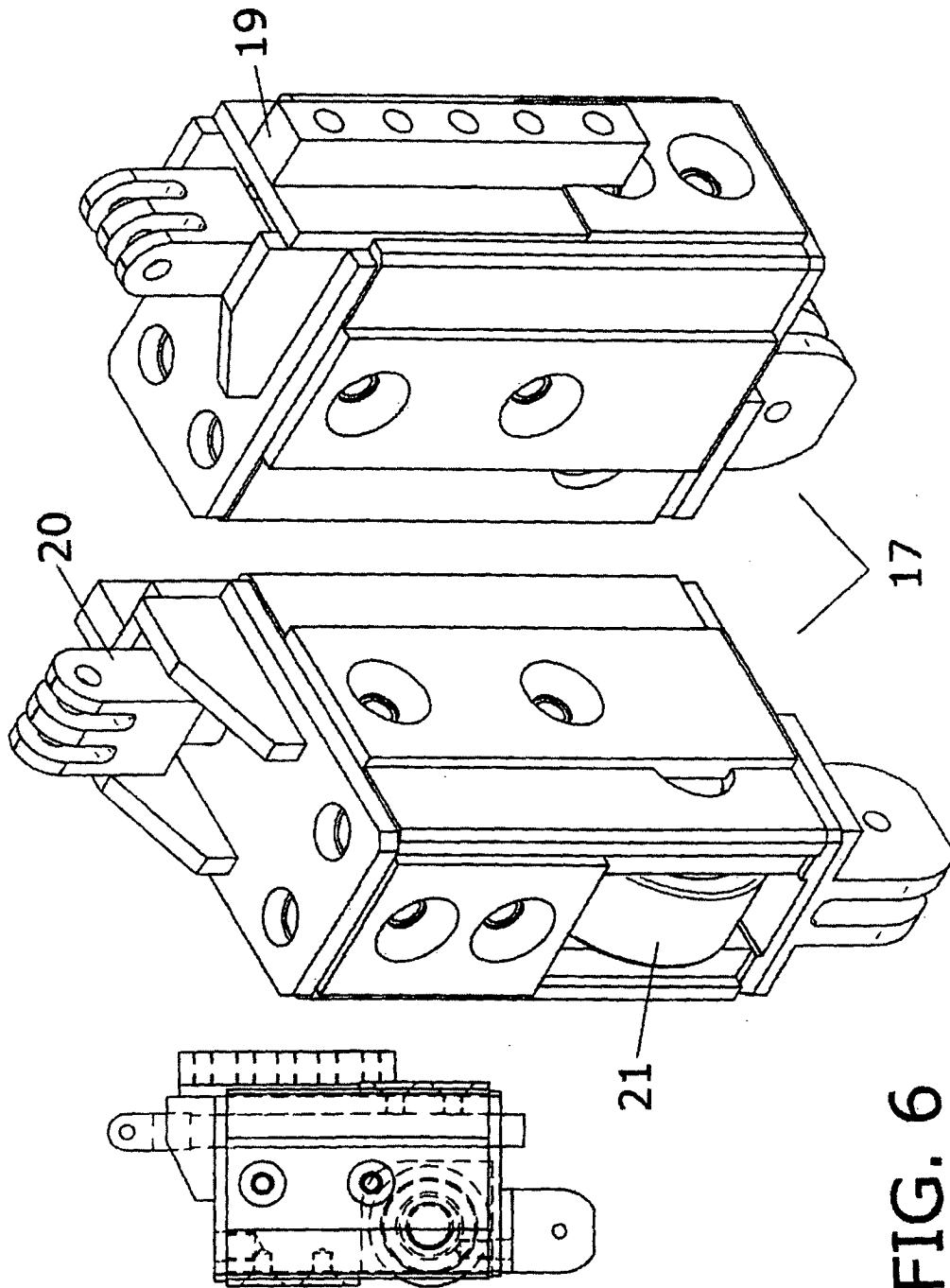


FIG. 6



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EUROPEAN SEARCH REPORT

Application Number
EP 04 38 1017

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.7)
X	US 3 732 997 A (R. REAVIS ET AL.) 15 May 1973 (1973-05-15) * column 1, line 59 - column 3, line 59 * * figures 1-6 *	1	B65F3/04
A	----- DE 861 375 C (DAIMLER-BENZ AG) 29 December 1952 (1952-12-29) * the whole document *	1	
A	----- DE 844 262 C (DAIMLER-BENZ AG) 17 July 1952 (1952-07-17) * the whole document *	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			B65F
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		8 February 2005	Smolders, R
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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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 04 38 1017

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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08-02-2005

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US 3732997	A	15-05-1973	NONE	
DE 861375	C	29-12-1952	NONE	
DE 844262	C	17-07-1952	NONE	

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82