(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 709 310 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
01.05.1996 Bulletin 1996/18

(51) Int. Cl.[6]: **B65F 3/04**

(21) Application number: **94830515.6**

(22) Date of filing: **28.10.1994**

(84) Designated Contracting States:
AT BE CH DE DK ES FR GB IT LI NL SE

(71) Applicant: **O.M.B. BRESCIA S.r.l.**
I-25020 Flero (Brescia) (IT)

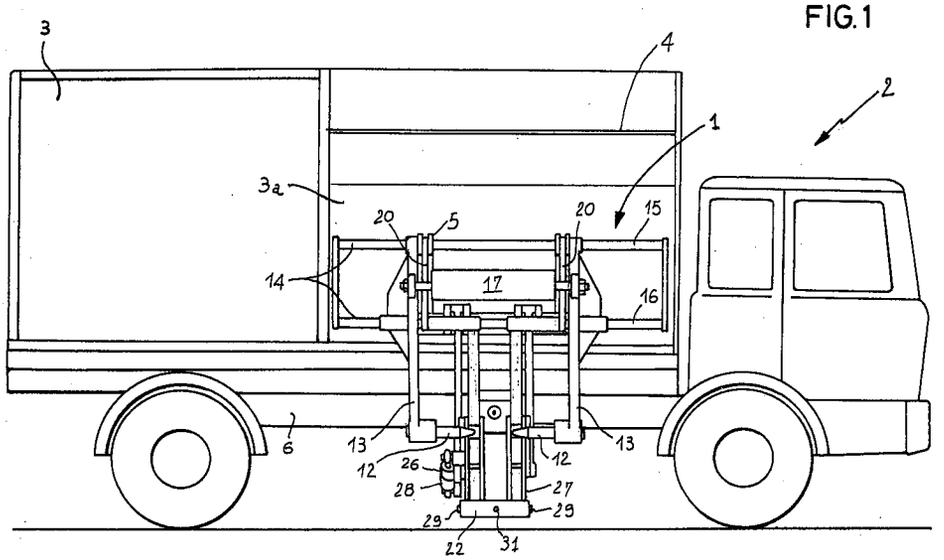
(72) Inventors:
- **Bragadina, Giovanni**
  I-25126 Collebeato (Brescia) (IT)
- **Savoldi, Franco**
  I-25020 Flero (Brescia) (IT)

(74) Representative: **Righetti, Giuseppe**
Bugnion S.p.A.
Via Carlo Farini, 81
I-20159 Milano (IT)

(54) A device for emptying rubbish skips onto a motor-vehicle designed to collect refuse

(57) The device comprises a guide structure (14) pivotally mounted to a bearing framework (5) and slidably engaging a pair of support arms (13) horizontally movable close to and away from each other. The arms (13) are provided with a pair of fitting pins (12) designed to be fitted into respective tubular seats (18) formed on a front wall (19) of a skip (10) to be emptied into a motor-vehicle box (3). Lifting actuators (21) acting on the guide structure (14) lift the skip (10) until it is above a charging hopper (4) provided in the box (3). A locating element (22) acting on the front wall (19) of the skip (10), at a lower position relative to the fitting pins (12), imparts a preliminary rotation to the skip during its raising step, immediately followed by an overturning rotation in order to cause the contents of said skip to be emptied into the charging hopper (4).

FIG.1



EP 0 709 310 A1

Description

The present invention relates to a device for emptying rubbish skips onto a motor-vehicle designed to collect refuse, comprising a bearing framework, operatively mounted to said motor-vehicle; a grasping unit designed to removably engage a rubbish skip to be emptied into the motor-vehicle; a lifting unit carrying the grasping unit and selectively activated to bring the rubbish skip from a position in which it rests on the ground to a raised position in which the skip is hung above a charging hopper exhibited by the motor-vehicle; overturning means associated with the lifting unit for rotating the skip about a horizontal axis when said skip is at the raised position.

It is known that, for municipal refuse disposal the use of appropriate rubbish skips is becoming increasingly more spread, which skips located at the road sides, are periodically emptied being discharged into motor-vehicles designed to convey said refuse to dumps, incinerators or other locations designed to treat such materials.

Said motor-vehicles are equipped with appropriate devices by which each rubbish skip is picked up from the ground for being emptied through overturning above a charging hopper arranged on the motor-vehicle, and subsequently laid down to the ground again.

Presently said devices are embodied according to different solutions so that they can pick the skip up and overturn it.

For example, there are devices which are mounted to a motor-vehicle side, thereby enabling operations to be carried out on the skip after merely moving the motor-vehicle close to said skip. In said devices, of the type described in the Italian Patent No. 1 136 006, the presence of a grasping unit is essentially provided and it consists of a pair of hooking elements carried by respective support arms and arranged to engage corresponding engagement pins projecting from the opposed side walls of the skip at a centered position relative to the vertical centre line of the walls themselves. The support arms are connected to a lifting unit enabling a vertical movement of same so as to cause lifting of the skip from the ground, as well as to overturning means operating an angular rotation of the skip about said pins in order to empty the skip contents into a charging hopper arranged in the motor-vehicle.

In greater detail, according to the work cycle of the device, the side-hooking elements disposed at a raised position relative to the skip and spaced apart a greater distance than the width of said skip, are lowered so as to be disposed side by side relative to the side walls of the skip until they reach a position below the side grasping pins exhibited by said skip. Subsequently, the support arms are driven close to each other so that the hooking elements move close to the side walls of the skip in order to operatively engage the grasping pins following the subsequent lifting movement aiming to bring the skip to the same level as the charging hopper. When lifting is completed, the operating means is operated and it causes emptying of the skip; afterwards the skip is laid down to the ground again following a reverse step sequence with respect to the preceding one.

In other embodiments, such as the one described in the Italian Patent No. 1 180 332, the lifting unit and overturning means are made of one or more fluid-operated actuators directly acting on the support arms of the side-hooking elements to simultaneously cause lifting and overturning of the skip by a single rotational movement of the support arms about a pivot axis of same. Provision is also made for devices in which the engagement of the skip for lifting and overturning it is carried out by a grasping element substantially in the form of an upwardly facing shovel designed to be inserted in a seat arranged on the front wall of the skip and substantially in the form of a downwardly open pocket.

If the skip is engaged at its front wall, there is an advantage as compared to the known art in that the picking up and laying down of the skip can occur even when said skip is located in side by side relation with other skips of the same type. In other words, when at a rubbish collection point more skips need to be disposed in mutual alignment, said skips can be disposed side by side thereby reducing the overall surface bulkiness taken up by same.

On the other hand, however, since the grasping element is vertically fitted in the pocket-shaped front seat of the skip, said skips may accidentally disengage from each other during the overturing step, which will cause falling of the skip.

It is a main object of the present invention to provided a device capable of picking up a rubbish skip by intervening on grasping seats arranged on the front wall of said skip, without on the other hand involving any potential risk of accidental disengagement of the skip during the lifting and overturning step.

It is a further object of the invention to provide a device which is adapted to cause a preliminary rotation of the skip while it is being lifted, so as to facilitate the subsequent overturning of same above the collection hopper.

The foregoing and further objects that will become more apparent in the course of the present description are substantially achieved by a device for emptying rubbish skips onto a motor-vehicle designed to collect municipal refuse, characterized in that said grasping unit comprises at least one fitting pin carried by a respective support arm slidably engaged along a guide structure in a horizontal direction and movable in order to cause axial insertion and disengagement of the fitting pin relative to at least one corresponding tubular engagement seats formed on a front wall of the skip; said overturning means exhibiting, at a position underlying the axis of said fitting pin, at least one locating element arranged to act in thrust relation against said side wall of the skip, so as to counteract the rotation tendency of the skip about said pins by effect of the skip weight.

Further features and advantages will be more fully understood from the detailed description of a preferred embodiment of a device for emptying rubbish skips onto

a motor-vehicle designed to collect municipal refuse, according to the present invention, given hereinafter by way of non-limiting example, with reference to the accompanying drawings, in which:

- Fig. 1 is a side view of a motor-vehicle for collecting municipal refuse, equipped with the device in question designed to pick up a rubbish skip, not shown;
- Fig. 2 is a fragmentary perspective view showing the main component parts of the device in reference, arranged to pick up a skip;
- Fig. 3 is a diagrammatic side view, partly sectioned along a vertical plane, of the inventive device during a skip picking up step;
- fig. 4 is a side view of the device partly sectioned along a vertical plane which is offset relative to the sectional plane referred to in fig. 3;
- Fig. 5 is a diagrammatic side view of the device while the skip is being overturned.

Referring to the drawings, a device for emptying rubbish skips onto a motor-vehicle designed to collect municipal refuse according to the present invention has been generally identified by reference numeral 1.

As clearly shown in Fig. 1, the device 1 is mounted to a side of a motor-vehicle 2 designed to collect municipal refuse in order to convey them to the dumps, In greater detail, the device 1 is mounted close to a recess 3a formed sideways in the box 3 of said motor-vehicle, which can be optionally provided with appropriate means for compacting the refuse introduced thereinto through a charging hopper 4 formed in the box itself.

The foregoing being stated, the device 1 comprises a bearing framework 5 operatively mounted on the motor-vehicle flatbed. In greater detail, the framework 5, as shown in Fig. 3, is preferentially provided to be slidably engaged to the flatbed 6 and be movable perpendicularly to the longitudinal extension of the motor-vehicle 2 upon command of one or more tranverse-movement actuators 7 or similar means, for the purposes better clarified in the following.

Operatively mounted on the bearing framework 5 is a lifting unit 8 in turn carrying a grasping unit 9 designed to removably engage a rubbish skip 10 (Figs. 3, 4, 5), to enable the movement of same from a position in which it rests on the ground to a raised position above the charging hopper 4, upon the action of the lifting unit iself.

Also associated with the lifting unit 8 is overturning means 11 designed to make the skip 10 rotate about a horizontal axis to cause emptying when the skip is to its raised position above the hopper 4.

In an original manner, the grasping unit 9 essentially comprises one or, as shown in the accompanying drawings, a pair of fitting pins 12 preferably disposed aligned in coaxial relation, facing each other, and provided with respective tapering ends 2a. The fitting pins 12 are fastened to respective support arms 13 in the form of a broken line and engaged to a guide structure 14. The guide structure 14 is preferably comprised of a first horizontal guide bar 15, rotatably engaged to the bearing framework 5 and a second guide bar 16 parallel to the first guide bar 15. The support arms 13, slidably passed through by the guide bars 15, 16, are simultaneously movable upon command of at least one double-rod actuator 17 operatively engaged to the guide structure 14 and exhibiting two opposed rods 17 each connected to one of the support arms 13. In a manner known per se, the double-rod actuator 17, not shown in Figs. 4 and 5, is similar, from an operating point of view, to a pair of opposed fluid-operated actuators parallelly connected in circuit, so that the support arms 13 are simultaneously moved, while remaining mechanically disengaged and independent of each other.

Translation of the support arms 13 close to and away from each other causes a consequent axial movement of the fitting pins 12 to selectively produce axial fitting and disengagement of said pins from corresponding tubular engagement seats 18 formed in a front wall 19 of the skip 10. Only one of said tubular engagement seats 18 is partly shown in Figs. 3, 4 and 5, Said tubular seats will not be further described and shown as they are the object of a European patent application on same date in the name of the same applicant to which please refer for further information.

Still in accordance with the present invention, the lifting unit 8 involves the presence of at least one lifting lever 20 fastened to the guide structure 14 and engaged to the bearing framework 5 according to a horizontal axis. More particularly, in the embodiment shown provision is made for a pair of lifting levers 20, fastened to the guide bars 15, 16. A lifting actuator (exclusively shown in Fig. 2) operates between the bearing framework 5 and each lifting lever 20 and it is adapted to cause mouvement of the guide structure 14 and, as a result, the support arms 13 about the pivot axis of the lifting levers 20, embodied by the geometrical axis of the first guide bar 15.

Still in accordance with the present invention, the overturning means 11 exhibits, at a position underlying the alignment axis of the fitting pins 12, at least one locating element 22 designed to act in thrust relation against the front wall 19 of the skip 10 so as to counteract the tendency to rotation of said skip about the pins 12 by effect ot the skip weight.

It will be noted, in fact, that since the engagement between the fitting pins 12 and tubular seats 18 is carried out at a spaced apart position from the skip centre of gravity, in the absence of the locating element 22 the skip will be liable to undesirably rotate clockwise with reference to Figs. 3, 4 and 5, as soon as it is raised from the ground.

Advantageously, the positioning of the locating element is controlled by a driving mechanism comprising at least one connecting lever 23 pivotally mounted to the bearing framework 5 according to an axis parallel to and spaced apart from the pivot axis of said lifting lever 20, as well as at least one interconnection connecting rod 24 operatively fixed between the connecting lever 23 and lifting lever 20. In greater detail, connection between the

interconnection connecting rod 24 and lifting lever 20 takes place at the end of an extension portion 20a integral with the lifting lever itself, so that the interconnection connecting rod 24, forms a four-bar linkage together with the lifting lever 20, connecting lever 23 and bearing framework 5.

Extending from the connecting lever 23, beyond the engagement point of the interconnection connecting rod 24, is a thrust extension 25 that, by means of at least one overturning actuator 26, is interconnected to an auxiliary arm 27 carrying the locating element 22 at the end thereof. On the opposite side relative to the locating member 22, the auxiliary arm 27 is fastened to the interconnection connecting rod 24 at a pivot point on the extension 20a being part of the lifting lever 20.

As discernible when Figs. 3, 4 and 5 are compared, during the skip movement until its maximum raised position, the overturning actuator 26 substantially acts as a connecting rod in order to define, together with the thrust extension 25, the interconnection connecting rod 24 and auxiliary arm 27, a driving mechanism in the form of a deformable articulated quadrilateral imparting the skip a preliminary rotation about the fitting pins 12 substantially through 90° and at all events of smaller amplitude than the rotation carried out by the support arms 13. The overturning actuator 24 lends itself to be operated when the lifted position is reached by the skip 10, in order to transmit a final overturning rotation to the skip, as shown in Fig. 5 where by a broken line it is drawn the position of the skip 10 before its final overturning.

In order to eliminate the risk that part of the skip contents may be accidentally dropped to the ground before the skip itself is disposed above the charging hopper 4 mouth, provision may be made to advantage for at least one auxiliary actuator 28 operatively connected in the extension of the overturning actuator 16 and selectively operable for reducing the width of said premilinary rotation during the skip movement from the position in which it rests on the ground and the raised position.

As shown in Fig. 2, all the component elements relating to said four-bar linkage and deformable articulated quadrilateral are preferably provided in pairs.

In an original manner, in order to be sure that the skip is recalled from its overturned position it is in addition preferably provided that at least one hooking pin 29 be associated with the locating element 11, which pin is movable, upon command of a respective fluid-operated actuator not shown as known per se and conventional, between an operating position in which it projects sideways from the locating element itself to engage a grip handle 30 fastened to the lower part of the front wall 19 of the skip 10, arid a rest condition in which it is axially retracted inside the locating element 22 to enable free movement of the latter away from and close to the front wall 19.

In the embodiment shown, the hooking pin 29 is directed and moves towards a horizontal direction, but it may also move vertically to engage a grip handle oriented horizontally on the front wall 19 of the skip 10.

Operation of the device described above mainly as regards structure is as follows.

During the motor-vehicle running, and at all events under non-use conditions of the device 1, said device has its support arms 13 and auxiliary arm 27 facing downwardly, the pins 12 being substantially at the same height as the tubular seats 18. Under this situation, the device 1 is completely contained within the outline of the motor-vehicle box 3.

For the purpose of emptying a skip 10 located along the road side, the motor-vehicle 2 is stopped in register with the skip itself so that the support arms 13 disposed in their maximum opening condition, have a substantially centered position relative to the longitudinal extension of the skip.

On stopping of the motor-vehicle 2, intervention of the transverse-movement actuator 7 is activated so that it acts on the bearing framework 5 to move the whole device towards the skip 10.

Suitable sensing means, preferably consisting of an ultrasonic distance-measuring detector having an emitting/receiving member 31 located for example on the locating element 22, operate stopping of the side-movement actuator 7 and therefore displacement of the whole device 1 towards the skip 10, when the fitting pins 12 are substantially in alignment with the tubular seats 18 and the locating element 22 is close to the front wall 10 of the skip itself.

The engagement of the ultrasonic distance-measuring detector is advantageous in that, unlike it would happen in the case of use of a proximity switch or a mechanical microswitch, such a detector is capable of continuously detecting the distance of the front wall 19 from the skip 10 and therefore operate, if necessary, slowing down of the device movement during the final step of its moving close to the skip, thereby avoiding the contact of the locating element 22 with the front wall 19 taking place with strong shocks.

Then intervention of the double-rod actuator 17 is operated and, as a result, by moving the support arms 13 close to each other, insertion of the fitting pins 12 into the tubular seats 18 occurs.

Possible inaccuracies in the pin positioning or alignment relative to the tubular seats 18 are accepted and compensated for, thanks to the end taperings 12a of the fitting pins.

At the same time, the hooking pin or pins 29 are caused to be axially extracted so that engagement of the locating element 22 with the grip handle or handles 30 arranged on the skip 10 occurs.

The lifting actuators 21, by acting on the corresponding lifting levers 20, cause the whole guide structure 14 to rotate about the axis of the first guide bar 15 and, as a result, the skip 10 is moved towards its maximum lifting position. During this movement involving an angular displacement through about 180° of the lifting levers 20 and support arms 13 about the axis of the first guide bar 15, the driving mechanism 23, 24, 25, 26 and 27 acting on

the locating element 22 imparts a preliminary rotation to the skip 10 towards the overturned condition.

The amplitude of said preliminary rotation is advantageously reduced as compared to the one performed by the lifting levers 20 and support arms 13, in order to avoid overturning of the skip contents before said skip 10 arrives at a position above the charging hooper 4. At the end part of the skip raising stroke, operation of the auxiliary actuator 28, if present, causes a slight straightening of the skip itself, in order to avoid any risk of early escape of the contents from same and/or shocks of the skip 10 against building walls or other hindrance disposed behind.

On reaching the lifted position, the auxiliary actuator 28 is brought back to the starting condition and the overturing actuator 26 is operated in order to obtain a complete rotation of the skip 10 about the fitting pins 12 and the subsequent emptying of the skip to the inside of the charging hopper 4.

An inverted operating sequence as compared to the one described above involves laying down of the skip 10 to the ground again, the device 1 coming back to its non-operating conditions.

The invention achieves the intended purposes.

It is pointed out in fact that the device in reference combines the advantages of practical use typical of known devices provided with a front grip for the skip, with the advantages in terms of safety that can be found in the devices carrying out grasping of the skip at the side walls. It will be recognized that, since the fitting pins 12 are disposed, during the non-use step, at a height substantially corresponding to that of the tubular seat 18, the emptying cycle of the skip takes place in a remarkably shorter period of time than in the devices of the known art, in which the grasping elements are in a raised condition during the non-use steps.

In addition, the prelimitary rotation transmitted to the skip during the lifting step causes the immediately subsequent overturning step to be obtained through the use of actuators of relatively reduced sizes, as a result both of the fact that a shorter rotation must be covered and that most of the inertia to rotation exhibited by the skip at the beginning of the overturning step has already been overcome.

The device in question can be mounted to advantage not only on one side of the vehicle, as in the example herein described, but also, if necessary, on the rear or on the front of the vehicle itself.

Claims

1. A device for emptying rubbish skips onto a motor-vehicle designed to collect refuse, comprising:

   - a bearing framework (5) , operatively mounted to said motor vehicle (2);
   - a grasping unit (9) designed to removably engage a rubbish skip (10) to be emptied into the motor-vehicle (2);
   - a lifting unit (8) carrying the grasping unit (9) and selectively activated to bring the rubbish skip (10) from a position in which it rests on the ground to a raised position in which the skip is hung above a charging hopper (4) exhibited by the motor-vehicle (2);
   - overturning means (11) associated with the lifting unit (8) for rotating the skip (10) about a horizontal axis when said skip is at its raised position, characterized in that said grasping unit comprises:
   - at least one fitting pin (12) carried by a respective support arm (13) slidably engaged along a guide structure (14) in a horizontal direction and movable in order to cause axial insertion and disengagement of the fitting pin relative to at least one corresponding tubular engagement seat (18) formed on a front wall (19) of the skip (10); said overturning means (11) exhibiting, at a position underlying the axis of said fitting pin, at least one locating element (22) arranged to act in thrust relation against said side wall (19) of the skip (10), so as to counteract the rotation tendency of the skip about said pins, by effect of the skip weight.

2. A device according to claim 1, characterized in that associated with said locating element (22) is at least one hooking pin (29) movable upon command of a fluid-operated hooking actuator between a rest position in which it frees the movement of the locating element relative to the front wall (19) of the skip (10), and an operating position in which it projects from the locating element (22) to engage a grip handle (30) fastened to said front wall (19) when the locating element is in abutment on said front wall.

3. A device according to claim 1, characterized in that said lifting unit (8) comprises:

   - at least one lifting lever (20) pivotally mounted to the bearing framework (5) according to a horizontal axis and fastened to said guide structure (14);
   - at least one lifting actuator operating between the bearing framework (5) and the lifting lever (20) to move the guide structure and support arms (13) about the pivot axis of the lifting lever (20) on the bearing framework (5).

4. A device according to claim 3, characterized in that said overturning means (11) comprises:

   - at least one connecting lever pivotally mounted to said bearing framework (5), according to an axis parallel to, and spaced apart from the pivot axis of the lifting lever (20);
   - at least one interconnection connecting rod (24) operatively fastened between said connecting

lever (23) and lifting lever (20) in order to define, together with said levers and bearing framework (5), a four-bar linkage driving mechanism;

- a thrust extension (25) extending at the end of the connecting lever (23) beyond the pivot point of the interconnection connecting rod (24);
- at least one auxiliary arm (27) carrying said locating element (22) at the end thereof;
- at least one overturning actuator (26) operatively engaged between the thrust extension (25) and the auxiliary arm (27), to define, together with said extension and arm as well as said interconnection interconnecting rod (24), a deformable-quadrilateral driving mechanism to impart a preliminary rotation to said skip (10) during its movement from the position in which it rests on the ground to the raised position; said overturning actuator (26) being operable to transmit a final overturning rotation to the skip (10) when the latter has reached its raised position.

5. A device according to claim 4, characterized in that it further comprises at least one auxiliary actuator (28) operatively connected in the extension of the overturning actuator (26) to reduce the amplitude of said preliminary rotation during the skip displacement from the position in which it rests on the ground to the raised position.

6. A device according to claim 3, characterized in that it further comprises at least one double-rod actuator (17) operatively engaged to the guide structure (14) and exhibiting two opposed rods (17a) each connected to one of said support arms 13 to move them simultaneously and independent of each other along the guide structure itself.

7. A device according to claim 1, characterized in that said guide structure (14) comprises first and second horizontal and parallel guide bars (15, 16) engaging said support arms (13) and said at least one lifting lever (20), said first guide bar (15) being pivotally mounted to the bearing framework (5) to define the pivot axis of the support arms and lifting lever.

8. A device according to claim 1, characterized in that it further comprises side-movement means (7) operating between the motor-vehicle (2) and said bearing framework (5) to move the device (1) sideways relative to the motor-vehicle itself, sensing means (31) being provided to cause stopping of the side-movement means (7) when the fitting pins (12) are aligned with the grasping seats (18) of the skip (10).

9. A device according to claim 8, characterized in that said sensing means comprises an ultrasonic distance-measuring detecting device having at least one emitting/receiving member (31) operatively mounted on said locating element (22).

FIG.1

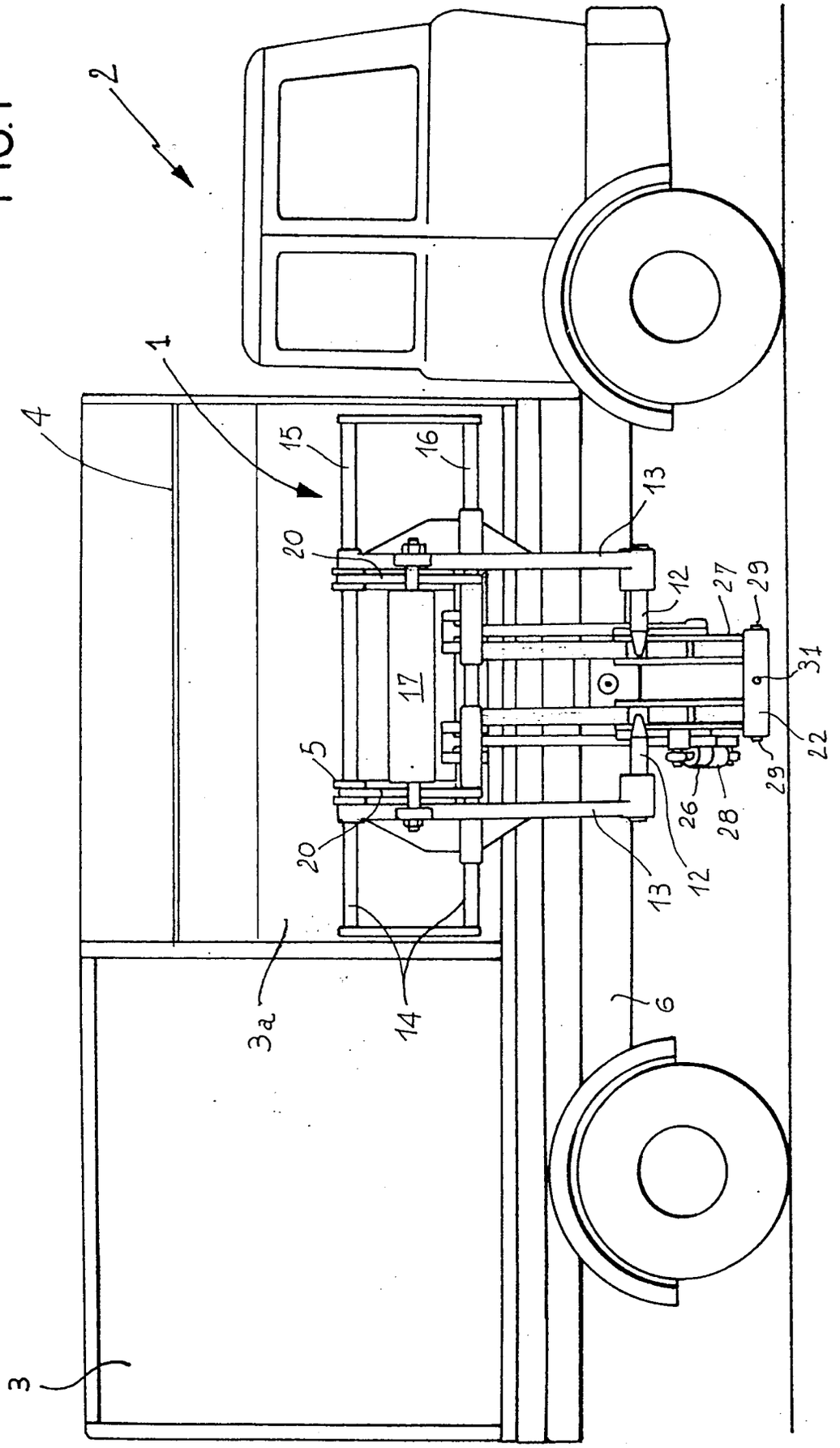


FIG. 2

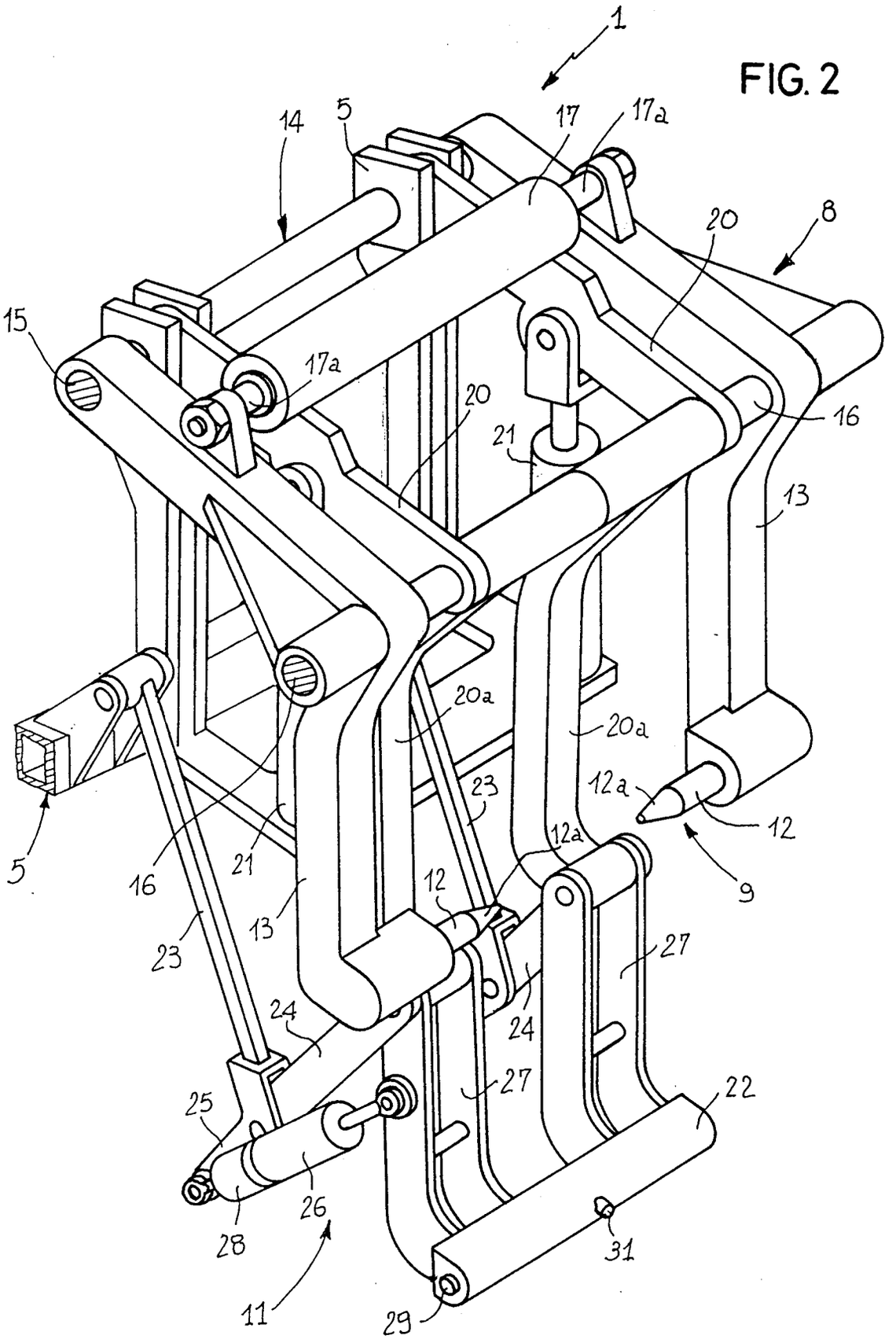

1
14
5
17
17a
20
8
15
17a
20
16
21
13
20a
20a
12a
23
12
5
16
21
12a
9
12
23
13
27
24
24
27
25
22
26
28
31
11
29

FIG. 3

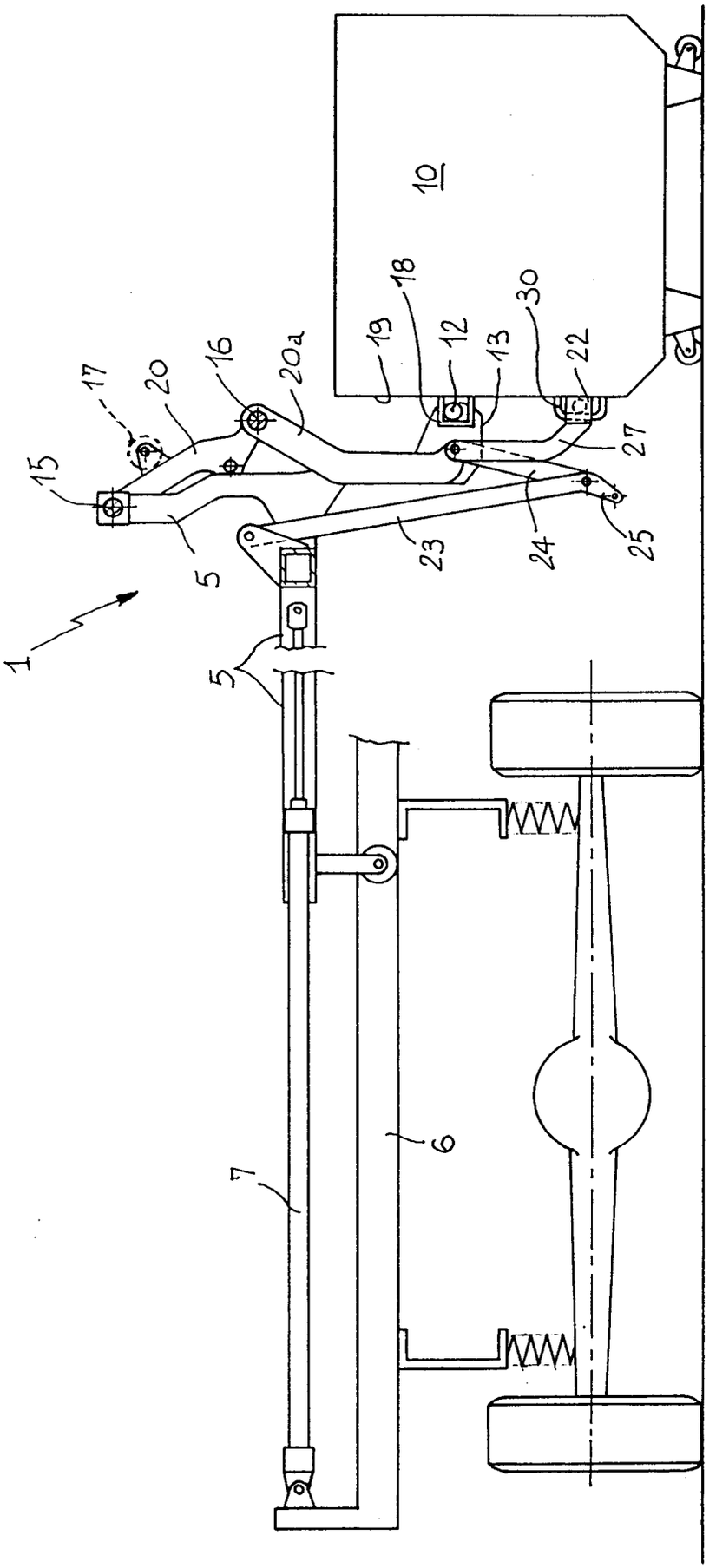
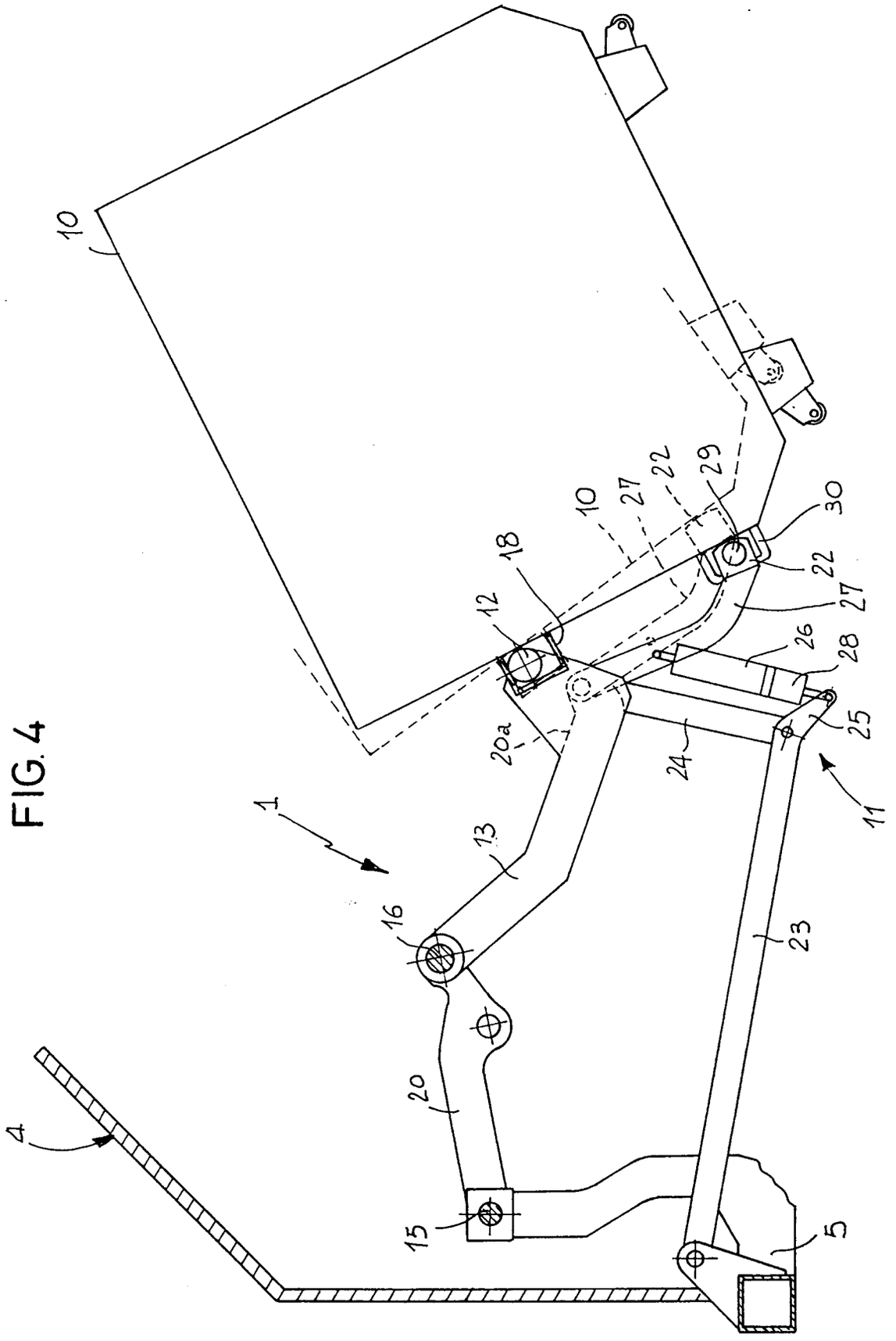


FIG. 4



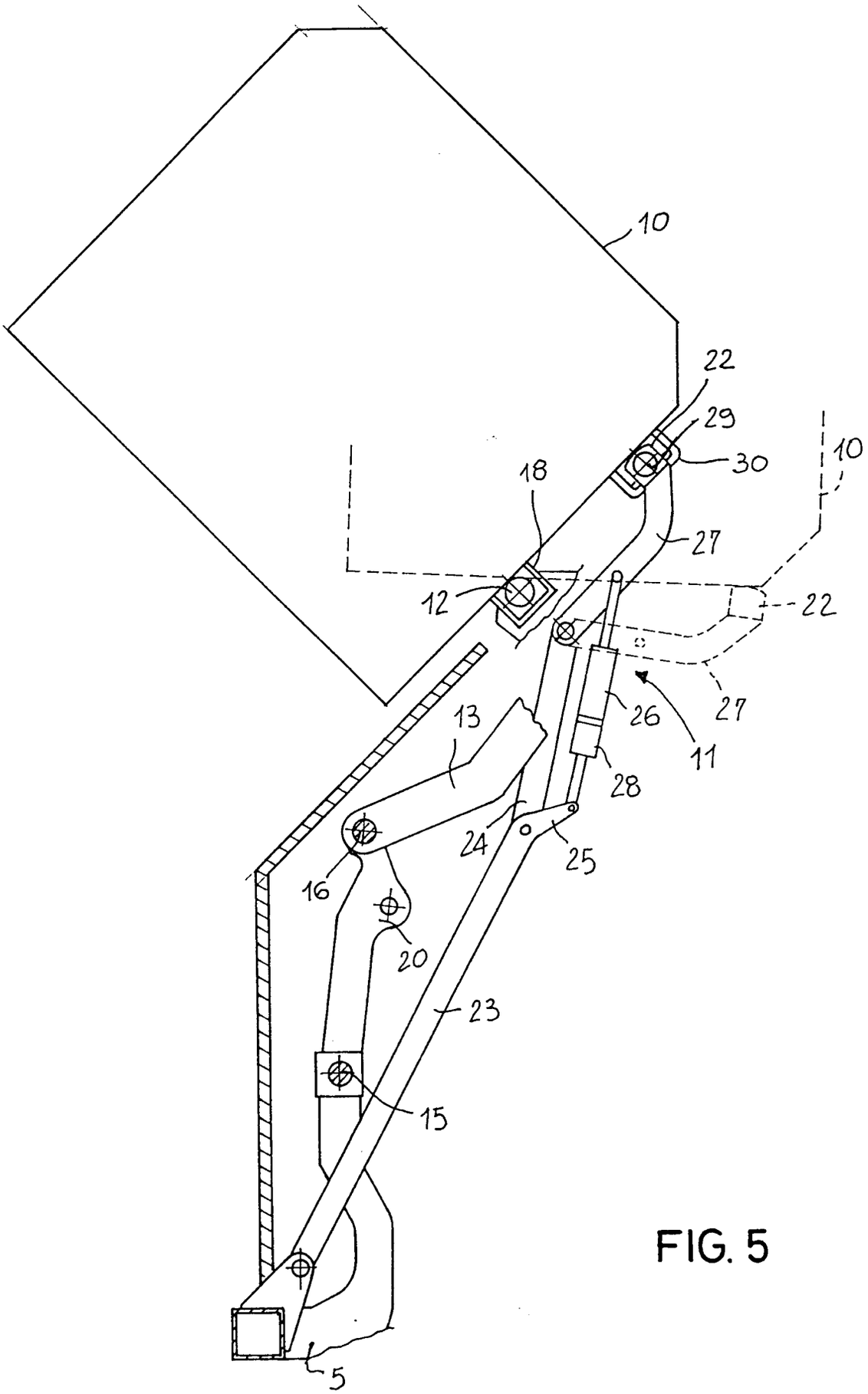


FIG. 5

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 94 83 0515

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.6)
A	US-A-3 027 028 (BROWN) * figures 1-5 *	1	B65F3/04
A	FR-A-2 388 697 (O.M.B. S.R.L.) * figure 11 *	1	
D,A	IT-A-1 180 332 (V.I.B. S.R.L.)	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6) B65F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	29 March 1995	Martínez Navarro, A.

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

EPO FORM 1503 03.82 (P04C01)