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(54) Truck for the collection of garbage and refuse.

(57) A truck for the collection of garbage and refuse of the type whose body (24) has adjacent the rear open end thereof a hopper (1) pivotally connected thereto at the top portion thereof and provided with means (2) for lifting garbage containers (C), discharging the contents of the latter in said hopper (1) and feeding the contents into the said truck load-containing body (24), said body comprising an ejector press (42) for discharging the contained garbage and refuse, the garbage container lifting assembly (2) is provided with means for initiating the lifting of the garbage containers (C) vertically and thereafter causing them, at the discharge height thereof, to be upturned and then be lowered vertically again, the lifting, upturning and lowering stages being carried out at different speeds, this being slower in the initial lifting stage of the lifting assembly (2), in the upturning of the container (C), in the return thereof to the vertical position and in the later lowering stage of the lifting assembly (2).

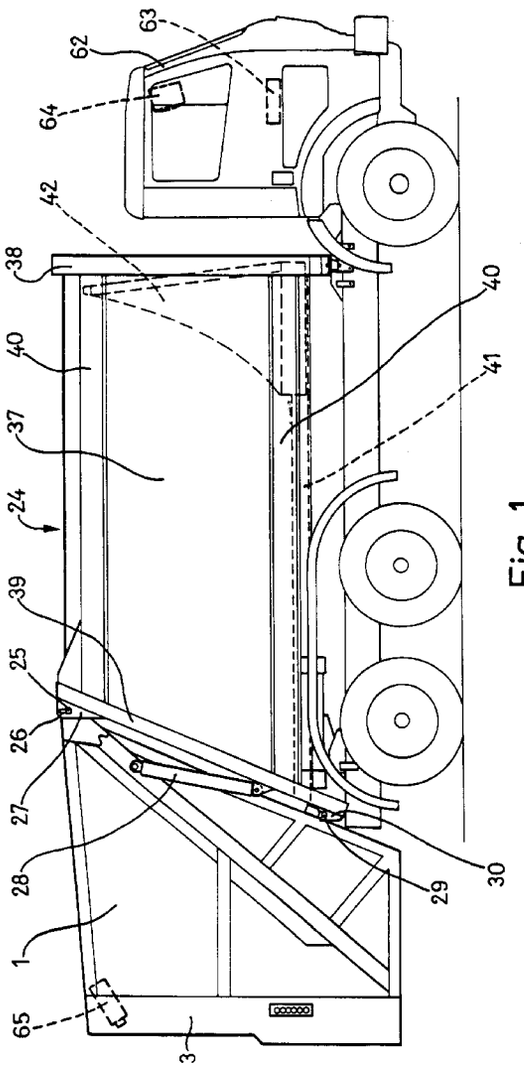

Fig. 1

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This invention relates to a truck for the collection of garbage and refuse, of the type comprising a load-containing body having adjacent the rear open end thereof a hopper pivotally connected thereto at the top portion thereof and provided with means for lifting garbage containers, discharging the contents of the latter in said hopper and feeding the contents into the said truck load body. The body comprises an ejector press for discharging the garbage and refuse contained therein.

Up to the present, the trucks of this type to be found on the streets of towns and cities, although they perform their mission of collecting garbage more or less correctly, suffer from a number of drawbacks such as the noise caused when loading and unloading the garbage containers, the spillage of, mainly liquid, refuse on the ground when lifting and upturning the garbage containers, the complexity of their mechanisms in general, which is the cause of more frequent maintenance and repair than would be desirable, and also of noise, lack of control from the driver's cab of the operations being performed at the rear of the truck and which may cause accidents to the workers in this area, the negative environmental impact due to the variegated form of the bodywork, the lack of automatic equipment providing greater security for all the operations.

These and other drawbacks provided by the known garbage collection trucks have been overcome with the present invention.

Thus, one of the main problems deriving from the garbage container lifting, upturning and lowering operations which are very noisy and are the cause of the abovementioned spillage, above all of liquids, has been solved with the formation of a new mechanism which in a first stage lifts the garbage container vertically, in a second stage when the garbage container has reached the height contemplated for emptying it is upturned and in a third stage the garbage container is lowered also vertically, with the peculiarity, also, that these stages are carried out at different speeds, a first slower stage until the garbage container is picked up, a faster stage when it is being lifted and a third, also slow stage at the time of upturning and emptying the garbage container. These three stages are repeated in the reverse order and may be carried out faster than the corresponding lifting stages, since the garbage container is now empty.

The problem of the environmental impact is solved by suitably enclosing the bodywork and the hopper with smooth plates which may be decorated as desired. These plates are complemented with further smaller lower plates covering the lower portion of the chassis sides and some of them are openable to allow access, for example, to the fuel tank, to the spare wheels and to the batteries.

A further feature of this new truck is the formation of the load-containing body with smooth plates, without the need for reinforcing ribs extending therealong. Said sheets have an arcuate section and occupy respectively the two side portions, the roof and the bottom of said body.

Another improvement of this invention consists of the simplification of the guide rails for movement of the ejector press along the load-containing body, the press being guided in this case by a single guide rail provided lengthwise in the centre of the bottom of the load-containing body. This main guide rail may be complemented with a secondary guide rail arranged lengthwise in the centre of the load-containing body roof to prevent swaying of the ejector press.

It is also a feature of this truck that the locking and unlocking of the coupling of the hopper to the load-containing body is effected with the hydraulic cylinders which pivotally raise the hopper for opening said body, said locking and unlocking being obtained with a slight linear lowering and raising, respectively, of the hopper to engage lateral stubs of the hopper in respective forks fixedly attached to the side members of the rear open end of the load-containing body.

Yet another improvement of the invention consists of the fitting of joint bushings in the joints of the hydraulic cylinders with which different devices and mechanisms of the truck are operated. This prevents said joints from working under stress, with the risk of breakage.

In this new truck, the operations carried out at the rear thereof are controlled from the cab by the driver himself, for which purpose there has been provided at the upper rear of the hopper a video camera displaying the images on a monitor installed in the cab.

Yet another of the features is the presence in the cab of a light and acoustic control panel for the different operations to be carried out, mainly the different stages of loading. Among these controls there is a main switch and a changeover switch for selecting an intermittent or continuous working cycle.

This truck also comprises a hydraulic system whereby it is possible to compact the garbage in the load-containing body, without this depending on the working section of the telescopic cylinder operating the ejector press. The hydraulic system prevents the forward feed of the press unless the hopper is raised.

Outstanding among the safety measures are those which stop the garbage container loading and unloading means and the garbage compacting means, if the truck moves.

These and other features will become better evident from the following description, to facilitate which there are attached eight sheets of drawings in which one embodiment given only as a non-limitative example of the scope of the present invention is illustrated.

In the drawings:

Figure 1 is a side view of the truck with the hopper closed, without the fairing;

Figure 2 is a semielevation view, partly in cross section, of the hopper loading open end;

Figure 3 is a cross section in plan view of the garbage container lift attached to the pertinent guide rail;

Figure 4 is a side elevation view in cross section of the garbage container lift.

Figure 5 is a side view of the rear of the truck, with the hopper open and partly in cross section;

Figure 6 is a front view of the bottom of the hopper;

Figure 7 is a side detail, on a larger scale, of the rear portion of the bottom of the hopper;

Figure 8 is a front elevation view of the truck body;

Figure 9 is a perspective view of the ejector press with the lower guide rail sliding shoes disconnected;

Figure 10 is a detail in elevation of the upper guiding of the ejector press in the truck body;

Figure 11 is a cross section view of the lower guiding of the ejector press in the truck body;

Figure 12 is a cross section view of the connection of a hydraulic cylinder;

Figure 13 is a side view of the faired truck;

Figure 14 is a perspective view of one of the panels forming the fairing of the truck body;

Figure 15 is a schematic cross section elevation view of the fairing of the body fixed to the truck chassis;

Figure 16 is a cross section plan view of the coupling of one of the plates forming the fairing of the truck body in the rear frame thereof;

Figure 17 shows the control panel; and

Figure 18 shows part of the truck hydraulic schematics.

According to the Figures, the truck for collecting garbage and refuse shown comprises, in the rear open end of the hopper 1, the assembly 2 which takes hold of and lifts the garbage containers, said assembly being vertically moveable between the two open facing tubular columns 3 disposed at either side of said open end.

For said movement, the assembly 2 is fixedly attached at both sides on corresponding sleeves 4 which, in turn, are mounted over respective shafts 5 (Figure 3) which are coupled and fixed at one end to an intermediate shaft 5' and at the other end to respective sliding shoes 6 which run on corresponding U-shaped guide ways 7 fixedly attached vertically to the inside of the columns 3.

Each sliding shoe 6 is formed by a block 6' having a respective side plate 6" fixed thereto and which slide on the guide way 7, said blocks also having attached thereto a vertical stem 8, terminated with a flaglike plate 8' which, when the assembly 2 is moved upwards by the action of two hydraulic cylinders 9 attached to said blocks 6' and which are coupled to respective supports 10 separably attached to ones or others of holes 11' formed in plates 11 attached to the upper portion of the columns 3, pass by two sensors 12 and 12' installed thereon and which provide the different speeds in the various lifting and upturning stages of the assembly 2.

The upturning is due to the fact that the sleeves 4 have fixedly attached to the free end thereof respective gear wheels 13 which on rising up the columns 3 encounter the corresponding roller racks 14 installed on the columns and with which they mesh.

Further to comprising the usual elements for taking hold of the different types of garbage container, the assembly 2 is provided with a sensor 15 of the type which adapts the different speeds of lifting, upturning and lowering to the features of the garbage container or containers to be unloaded, it also being possible to program such speeds at will.

Furthermore, the arms 16 of said assembly 2 for engaging the garbage containers by their side handles are provided to such end with two links 17, 18, with respective upper fingers 17', 18' retaining such handles by the ends thereof.

At the top, the rear open end of the hopper has pivotally mounted thereto at a mid portion thereof by means of arms 19' elbowed to the interior of said open end, a cross member 19 having attached to the lower edge thereof a resilient U-shaped band 20, acting as shock absorber for certain garbage containers which need such support, said cross member 19 being controlled by a pneumatic cylinder 21 which places it in the position of use or conceals it inside the truck body (Figure 4), depending on the type of garbage container to be discharged.

The open end of the truck body also has pivotally mounted thereto at the top on both sides of the cross member 19, respective arms 22 terminated in a hook 22' for opening the lid T of the garbage containers C as required, said arms 22 being moved to the rest position thereof by respective gas springs 23, also pivotally mounted to the said open end of the truck body.

The hopper 1 is pivotally mounted at the top to the rear open end of the body 24 by respective side stubs 25 which are inserted in corresponding vertical elongate holes 26 of lugs 27 mounted on the side of the top portion of the said open end of the body 24, the hopper 1 being lifted for unloading the truck by the action of two external side hydraulic cylinders 28, pivotably attached thereto and to the body 24 and after they have released said hopper from the closed position thereof, which is achieved by raising respective lower side stubs 29 which are engaged in respective forks 30 of the lower portion of the side members of the upper open end of the body 24 (Figure 5).

The bottom of the hopper 1 is formed by a single arcuate plate 31 which is attached at the front and rear edges to respective tubular cross members 32

and 33 and the lower surface of said plate 31 is also reinforced longitudinally by flat tie bars 34 adapted thereto and spaced apart at regular intervals, being attached thereto only at the end portions thereof, said joints being reinforced with respective U-shaped gussets 35 and 36 (Figure 6).

In turn, the body 24 is formed by four arcuate plates 37 forming the roof, the bottom and the side walls and which are attached to the front and rear frames 38 and 39, the concave surface of said plates 37 facing the inside of the body 24, the latter being externally reinforced longitudinally with two pairs of sections 40 occupying the upper and lower portions of the side members.

The load-containing body 24 has attached to the interior thereof, on the lower sheet 37 forming the bottom a longitudinal central I section 41 forming the guide railfor the ejector press 42 (Figure 9) when moving. To this end, the said press 42 has fixedly attached thereto, under the frame 42' forming the base thereof, two U-shaped longitudinal sections 43 the open sides of which face each other, the corresponding ends of a further two inverted L-shaped sections 44 being fixedly attached to the intermediate and lower portions of the former sections. The latter form in the sections 43 two tubular members which, when inserted in the sides of the section 41, support at the top and the bottom respective sliding shoes 45 for sliding along the inner surfaces of the flanges and web of said section 41.

The sliding shoes 45 are longitudinally locked against the sections 43 and 44 by covers 46 which are attached with screws 47 to plates 48 fixedly attached at the ends of the tubular members forming the said sections 43, 44, with the said covers extending out from the members at the top and at the bottom.

Likewise, the covers 46 have the upper and lower edges thereof provided with respective lips 46' which engage in corresponding steps 45' of the sliding shoes 45 and grip them with intermediate teeth 46" preventing lateral movement (Figure 11).

The ejection press 42 guiding is complemented with a further longitudinal central tubular guide member 47 fixedly attached to the metal sheet 37 forming the roof of the body 24 which is engaged by two sliding shoes 48 which slide therealong and are attached to the vertical portions of a U-shaped section 49 fixed in turn to a support 50 fixedly attached in the centre to the upper portion of the ejector press 42.

Furthermore, the majority of the hydraulic cylinders with which the various truck mechanisms are driven, such as the carriage pushing the garbage into the body 24, are attached to the mechanisms by a joint bushing 51 retained by the pertinent end 54 of the cylinder, with a friction washer 54'. Said joint bushing 51 is mounted around the pivoting shaft 52 retained at the ends thereof in two forked wings 53 provided in the pertinent device.

The body 24 and the hopper 1 have the respective external side walls thereof faired with respective plates 55 and 56 which are smooth on the outside and are reinforced on the inside with metal straps 59, said plates being provided at the top and bottom thereof with corresponding longitudinal flanges 57 projecting to the inside thereof and provided with holes 58 for attachment, by bolts, to the said body 24 and hopper 1, after the said plates 55 and 56 have been engaged behind respective flanges 60 fixedly attached to the frame 39 and the columns 3, the plates 56 also comprising a trap 56' for access to certain parts thereof, with all the plates 55 and 56 being extended at the bottom edge thereof with a number of plates 61 which cover the truck chassis and the lower portion of the hopper, some of said plates 61 being openable for the necessary access to certain parts of the said chassis.

The truck is provided in the cab 62 with a control panel 63 for the operations to be carried out thereby and a monitor 64' connected to a camera 65 installed at the open end of the hopper 1, said panel comprising a main switch 66 for said operations, a control 67 so that each work cycle may be carried out continuously or intermittently, respective warning lights 68 for control thereof and, among others, warning lights 69 for controlling the different stages of the work cycle, the emergency stop indicator light 70 and the hopper raised indicator light 71.

The truck hydraulic system has also been provided with the valve 72 which makes it possible for the retaining or precompacting of the garbage against the ejector press to depend on the cylinders 73 which cause the carriage carrying the compacting blade, driving in turn the ejector press to eject the garbage from the body, to be moved only when the hopper 1 is raised, since the valve 74, driving the ejector press cylinder 75 depends on the elevating cylinders 28 of said hopper.

The truck is also provided with a relay (not shown) cutting off the supply to the loading and discharge means of the containers, as well as the garbage compacting means, by stopping them when the truck is moving, to which end said relay is connected to pertinent circuits associated with the handbrake, the universal transmission joint or any other device of the truck related to the movement thereof.

Claims

1.- A truck for the collection of garbage and refuse, of the type whose body (24) has adjacent the rear open end thereof a hopper (1) pivotally connected thereto at the top portion thereof and provided with means (2) for lifting garbage containers (C), discharging the contents of the latter in said hopper (1) and feeding the contents into the said truck load-containing body (24), said body comprising an ejector

press (42) for discharging the contained garbage and refuse, characterized in that the garbage container lifting assembly (2) is provided with means for initiating the lifting of the garbage containers (C) vertically and thereafter causing them, at the discharge height thereof, to be upturned and then be lowered vertically again, the lifting, upturning and lowering stages being carried out at different speeds, this being slower in the initial lifting stage of the lifting assembly (2), in the upturning of the container (C), in the return thereof to the vertical position and in the later lowering stage of the lifting assembly (2).

2.- A truck for the collection of garbage and refuse, according to claim 1, characterized in that the garbage container lifting assembly drive means comprise, on each side of said assembly, respective shafts (5) terminated with sliding shoes (6) which run in respective vertical guides (7) arranged facing each other in the side members of the rear open end of the hopper (1), on which shafts (5) the lifting assembly (2) may be upturned by means of sleeves (4) rotatably mounted on said shafts (5) and fixedly attached to the sides of said assembly (2), said sleeves (4) being integrally provided at the free end thereof with respective gear wheels (13) which in the lifting of the lifting assembly (2) determine the upturning thereof on engaging with a roller rack (14) provided on the side members of the hopper (1) rear open end at the height at which the garbage containers (C) are to be discharged.

3.- A truck for the collection of garbage and refuse, according to claim 1, characterized in that there are provided on the side members of the hopper (1) rear open end sensors (12, 12') at different heights which provide the orders for the changes of speed of lifting (2), upturning and lowering of said assembly (2) as the latter passes them.

4.- A truck for the collection of garbage and refuse, according to claim 3, characterized in that there is provided in the hopper (1) rear open end a sensor (15) for the type of garbage container (C) to be lifted and which adapts the different speeds of lifting, upturning and lowering to said garbage container (C), which speeds may also be programmed at will.

5.- A truck for the collection of garbage and refuse, according to claim 1, characterized in that the lifting assembly (2) has the arms (16), for engaging the garbage containers (C) with the side handles thereof, provided with two hooks (17,18) having an upper retaining finger (17,18') against which the ends of the handles are engaged.

6.- A truck for the collection of garbage and refuse, according to claim 1, characterized in that it has the support means for the garbage containers (C) when being upturned and the garbage container lid (T) opening means formed respectively by a cross member (19) provided with a resilient U-shaped band (20) damping the support thereagainst of the garbage containers and by two side arms (22) terminated in a hook (22').

7.- A truck for the collection of garbage and refuse, according to claim 1, characterized in that the hopper (1) is pivotably connected at the top thereof to the rear open end of the load-containing body (24) by respective side stubs (25) inserted in respective elongate holes (26) provided in corresponding lugs (27) fixedly attached to the top of the side members of said open end, the hopper (1)being locked against the said open end, when in the closed position, by respective stubs (29) provided at the lower portion of the side members thereof and which engage in respective forks (36) fixedly attached to the lower portion of the side members of the rear open end of the load-containing body (24), which hopper (1) is caused to be raised or lowered to unlock it or lock it in the closed position thereof.

8.- A truck for the collection of garbage and refuse, according to claim 7, characterized in that the hopper (1) is raised or lowered with the same hydraulic cylinders (28) as are used to raise it pivotally for opening the load-containing body (24).

9.- A truck for the collection of garbage and refuse, according to claim 1, characterized in that the arcuate ramp (31) forming the bottom of the hopper (1) is formed by a single sheet which on the lower side thereof is reinforced with flat tie bars (34) adapted thereto and which are attached thereto only by the end portions thereof which are reinforced with the attachment of respective U-shaped gussets (35,36).

10.- A truck for the collection of garbage and refuse, according to claim 1, characterized in that the load-containing body (24) is formed in cross section with respective arcuate sheets (37) whose concave face is on the inside and which occupy the sides, the ceiling and the bottom of said body.

11.- A truck for the collection of garbage and refuse, according to claim 10, characterized in that the load-containing body (24) is provided at the sides with respective longitudinal reinforcements formed by respective sections (40) occupying the top and bottom outer portion of the sides of the body (24).

12.- A truck for the collection of garbage and refuse, according to claim 1, characterized in that the bottom of the load-containing body (24) is provided with a single central longitudinal guide rail (41) for the movement of the ejector press (42), in correspondence with which guide rail said press is provided, at the lower centre portion thereof, with longitudinal sliding coupling members.

13.- A truck for the collection of garbage and refuse, according to claim 12, characterized in that the centre guide rail (41) of the load-containing body (24) has an I section.

14.- A truck for the collection of garbage and refuse, according to claims 12 and 13, characterized in that the sliding coupling members of the ejector press

(42) are formed by two longitudinal sections (43) supporting at the top and the bottom respective sliding shoes (45) engaging the inner surface of the flanges and web of the I guide rail (41).

15.- A truck for the collection of garbage and refuse, according to claim 12, characterized in that the guiding of the ejector press (42) is complemented with a further longitudinal centre guide rail (47) provided in the roof of the load-containing body (24), with which there are slidingly engaged corresponding sliding shoes (48) provided in a U-shaped (49) support of the upper centre of the ejector press (42) and which run along both sides of said guide rail (47).

16.- A truck for the collection of garbage and refuse, according to claim 1, characterized in that the hydraulic cylinders with which the different devices are operated and among them the carriage pushing the garbage from the hopper (1) to the load-containing body (24) are coupled to the latter by joint bushings (51)mounted on the pivot shaft (52).

17.- A truck for the collection of garbage and refuse, according to claim 1, characterized in that the load-containing body (24) and the hopper (1) are faired at the sides with the attachment of respective plates (55,56) superimposed on said side members.

18.- A truck for the collection of garbage and refuse, according to claim 15, characterized in that the side fairing of the load-containing body (24) and the hopper (1) is complemented with further lower plates (61), one or more of which are openable.

19.- A truck for the collection of garbage and refuse, according to claim 1, characterized in that the hopper (1) is provided at the upper rear portion thereof with a video camera (65) communicating with a monitor (64) provided in the truck cab (62) for controlling all the loading and discharge operations from the cab.

20.- A truck for the collection of garbage and refuse, according to claim 1, characterized in that the cab (62) comprises a control panel (63) for the different operations to be carried out, mainly the loading operations, there being among such controls a main start switch (66) for the different operations and a control (67) for selecting the intermittent or continuous work cycle.

21.- A truck for the collection of garbage and refuse, according to claim 1, characterized in that it comprises a hydraulic system regulating uniform compacting of the rubbish by control of the recoil movement of the ejector press (42) in the successive loadings, without depending on the work section of the telescopic cylinder (75) operating said press.

22.- A truck for the collection of garbage and refuse, according to claim 1, characterized in that it comprises a hydraulic system preventing the ejector press (42) from feeding forward unless the hopper (1) is raised.

23.- A truck for the collection of garbage and refuse, according to claim 1, characterized in that it comprises safety means blocking the garbage container loading (C) and discharge means and the garbage compacting means if the truck is moving.

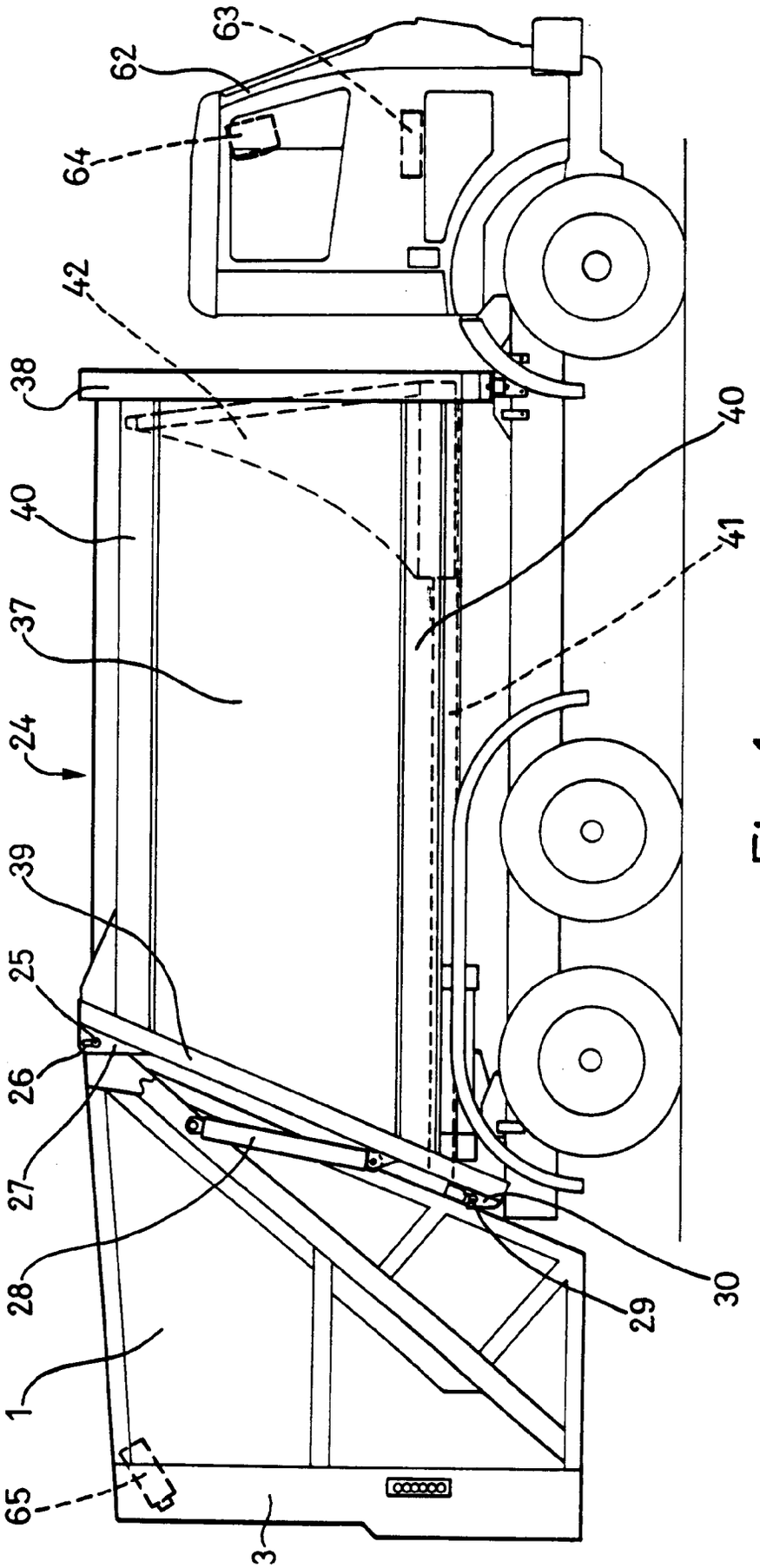

Fig. 1

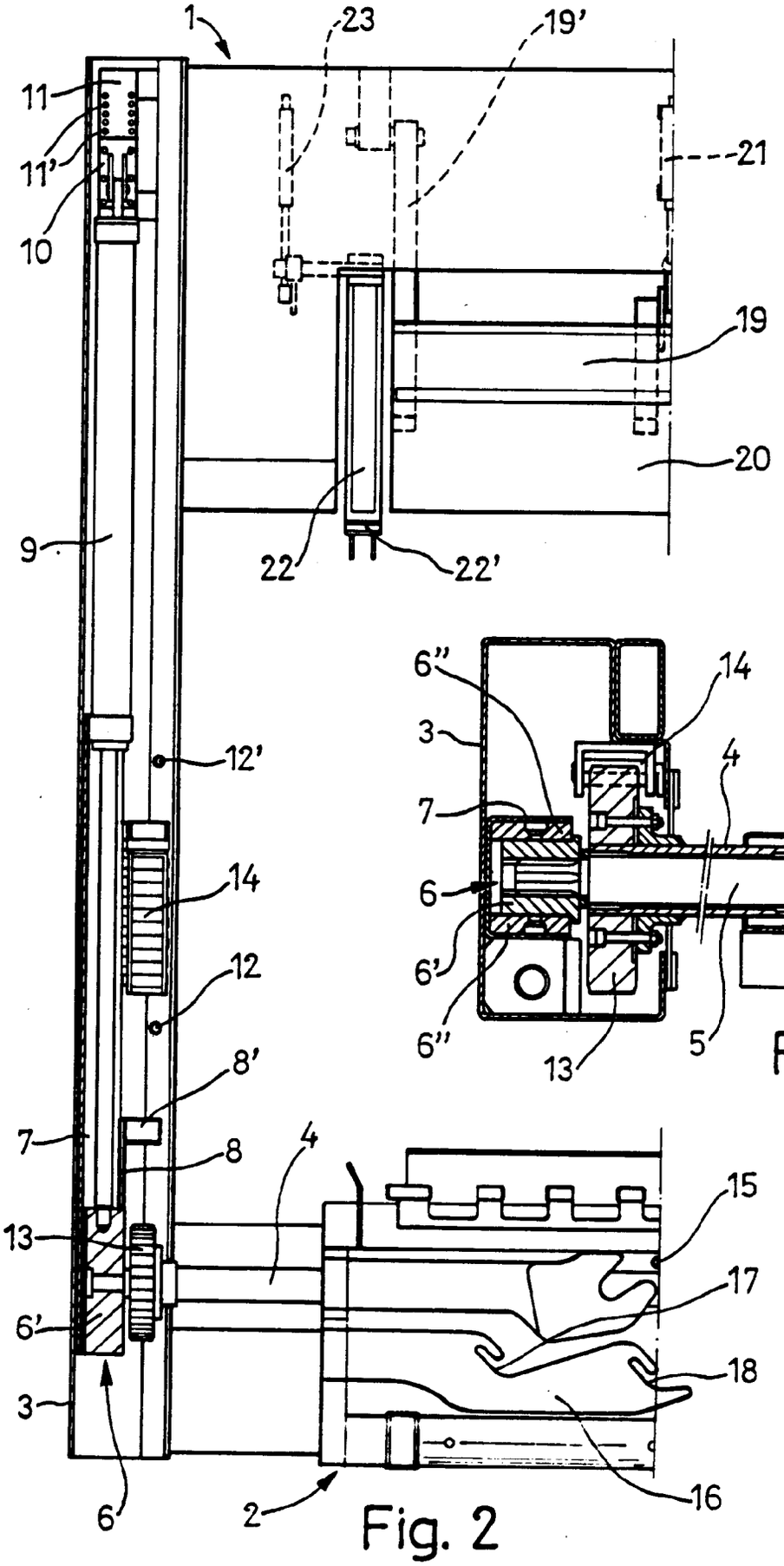
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Fig. 2

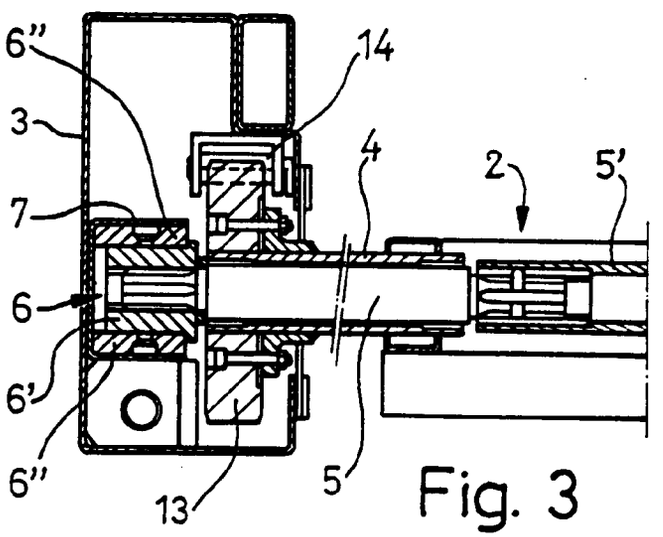
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Fig. 3

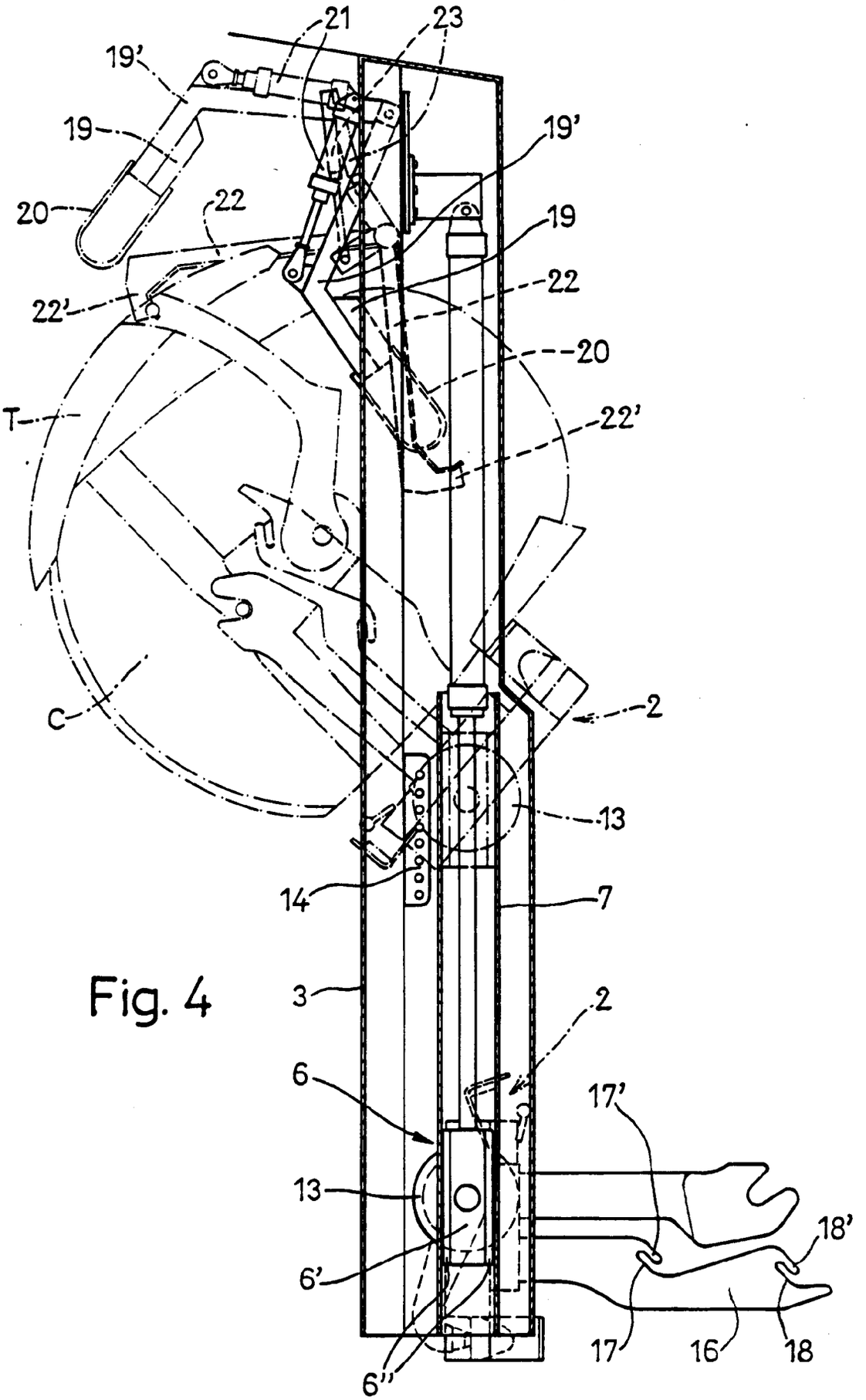


Fig. 4

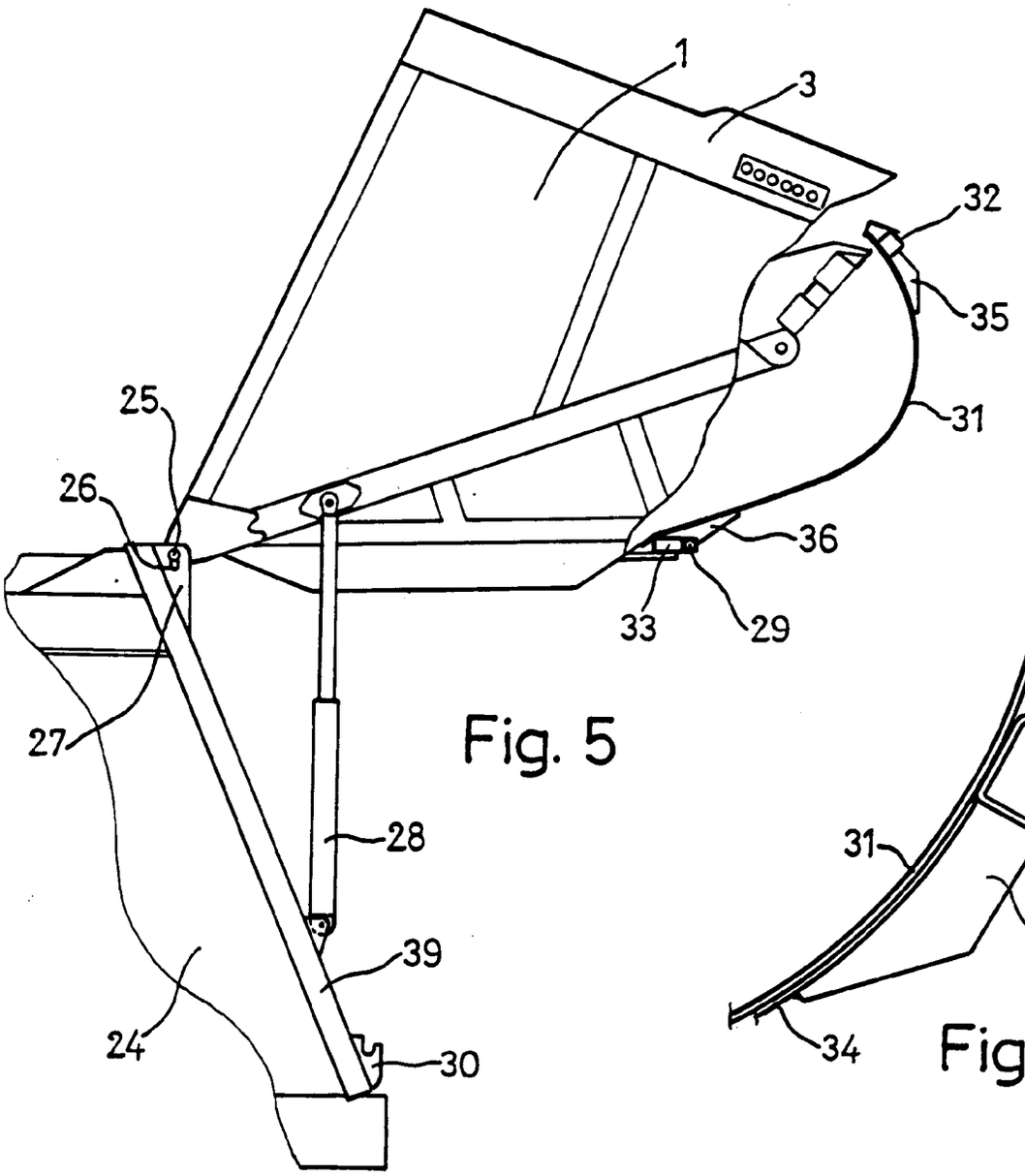
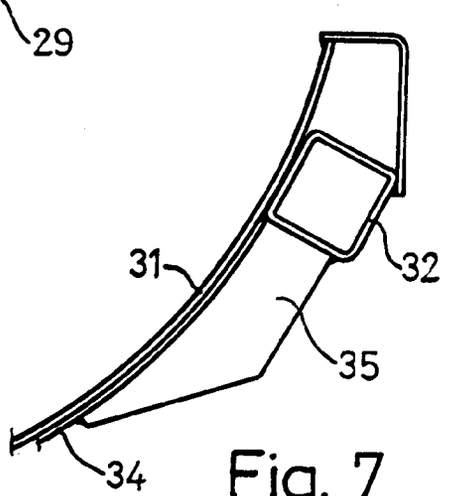


Fig. 5



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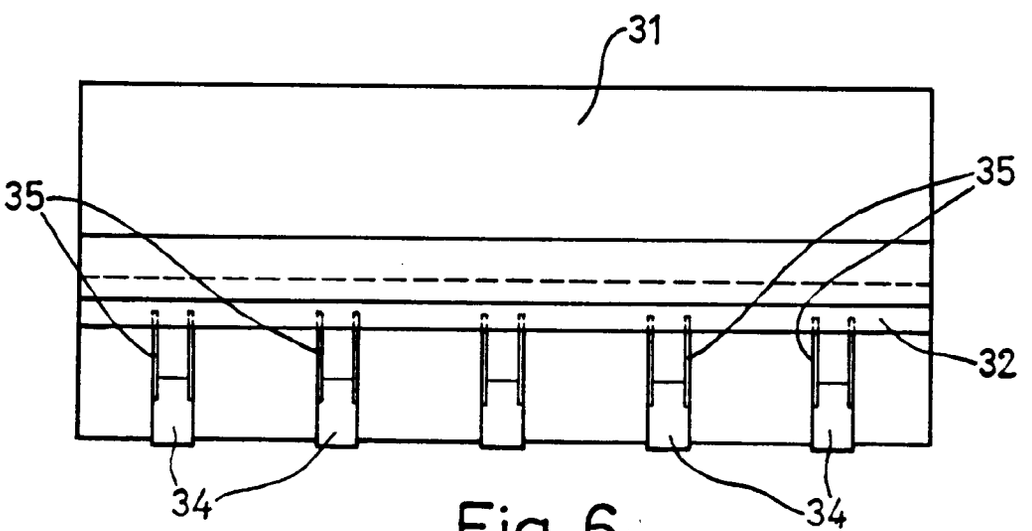

Fig. 6

Fig. 9

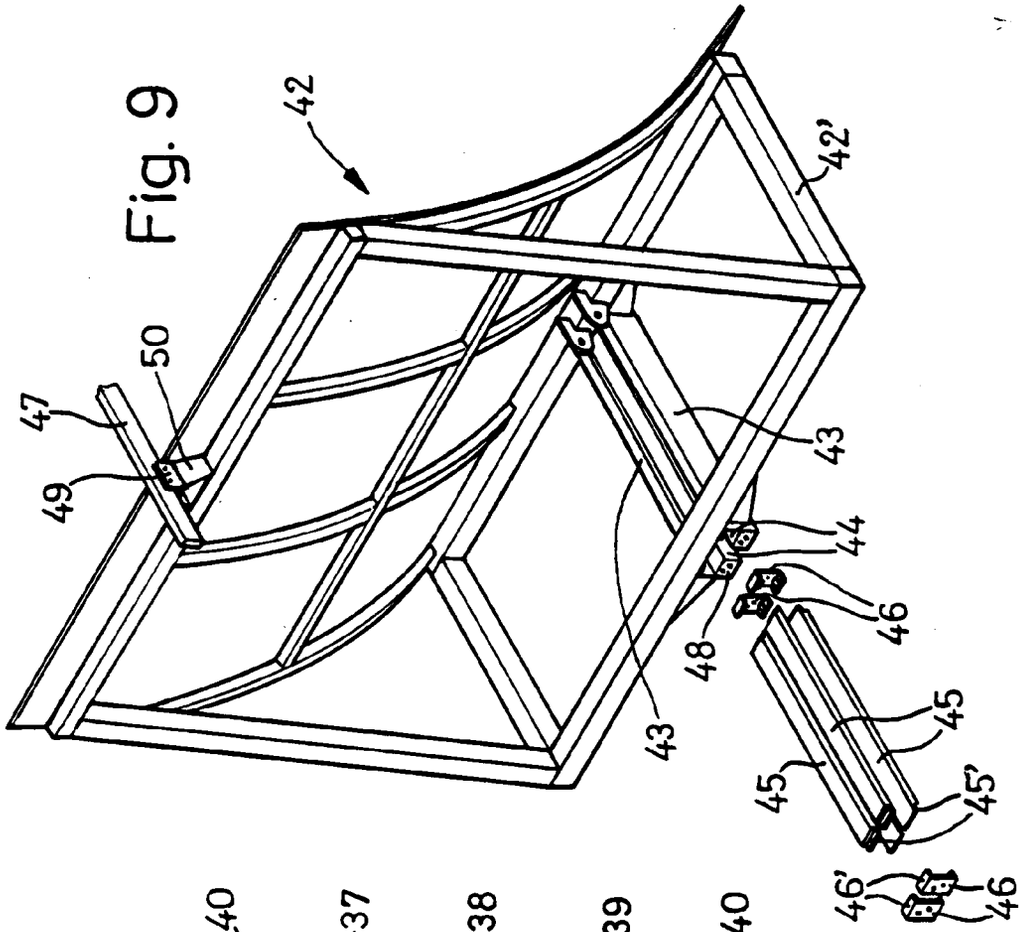
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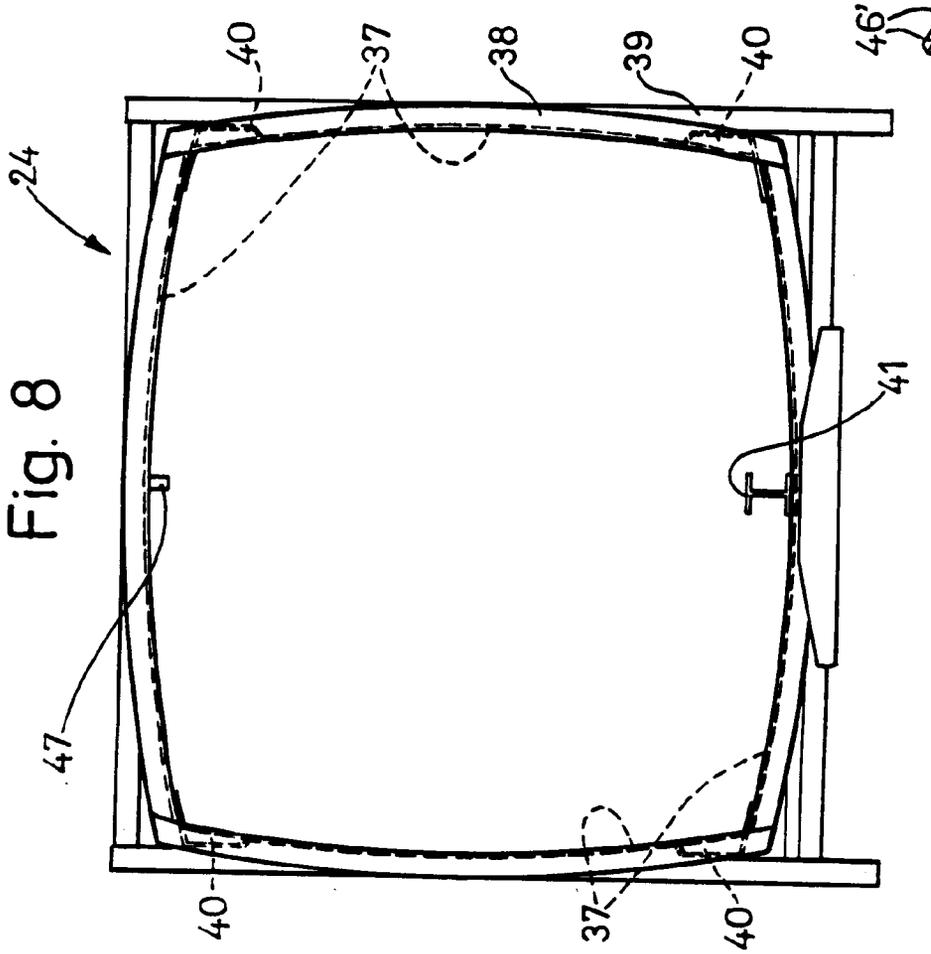
Fig. 8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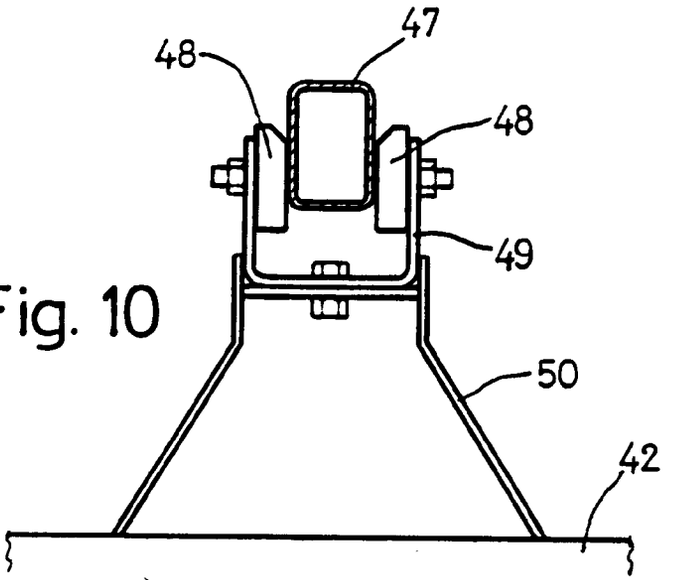

Fig. 10

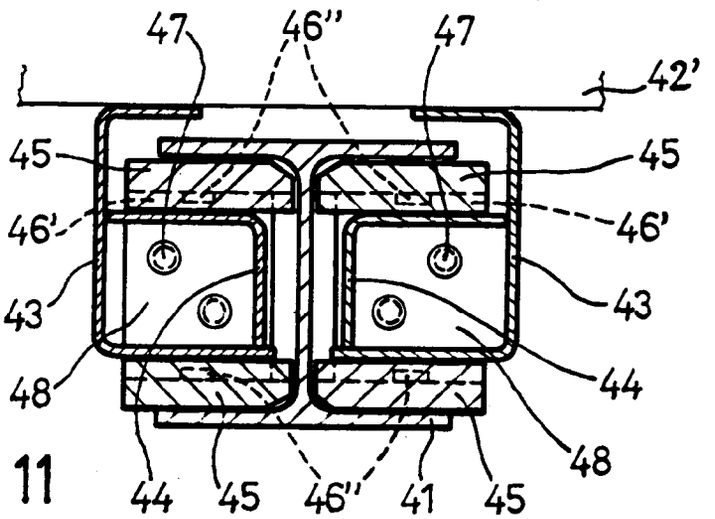

Fig. 11

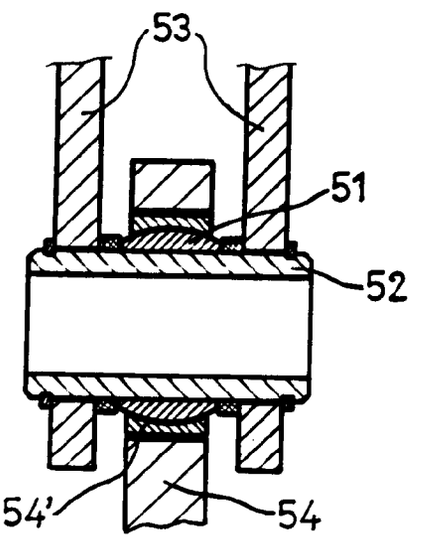

Fig. 12

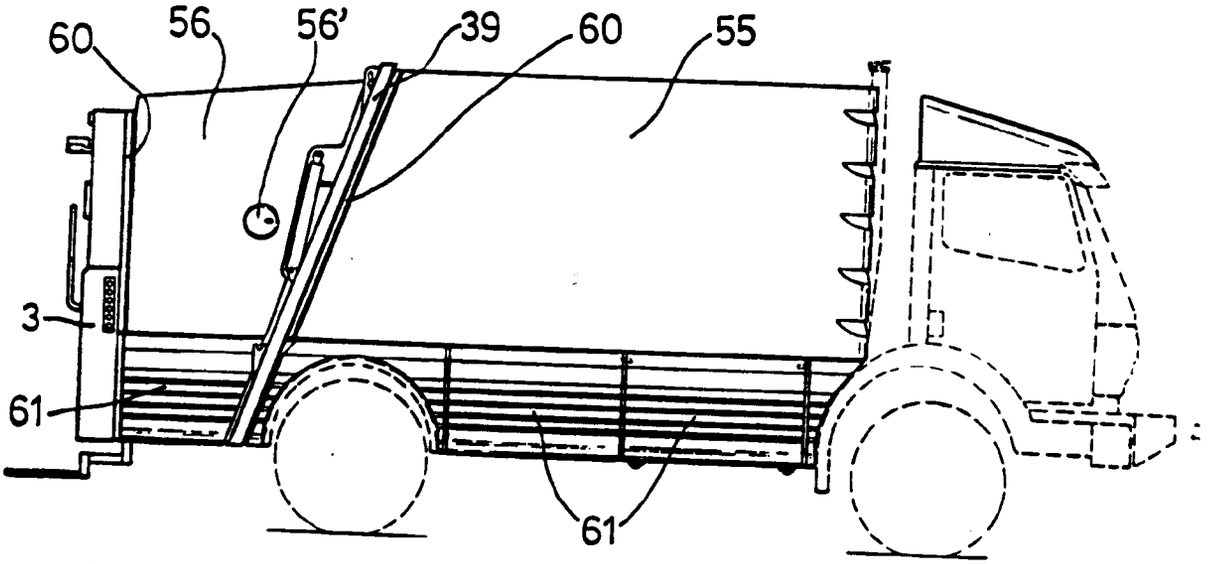

Fig. 13

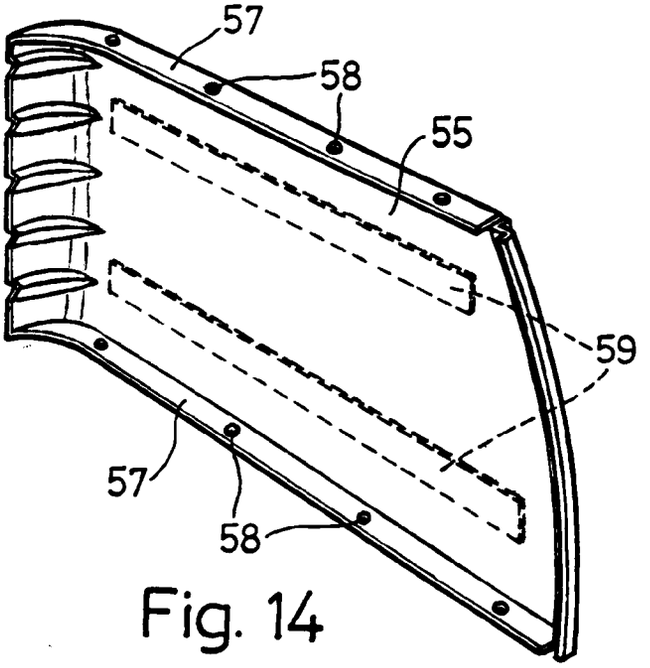

Fig. 14

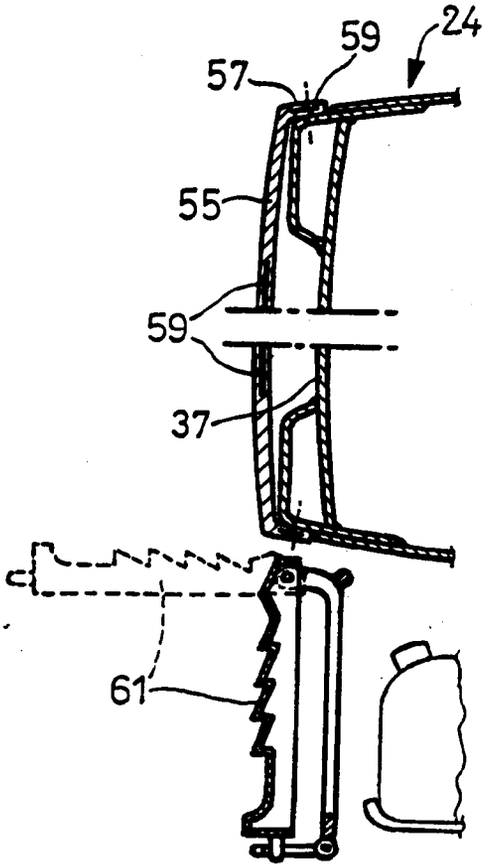

Fig. 15

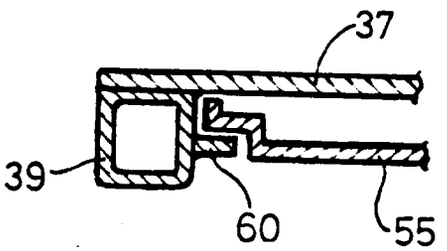

Fig. 16

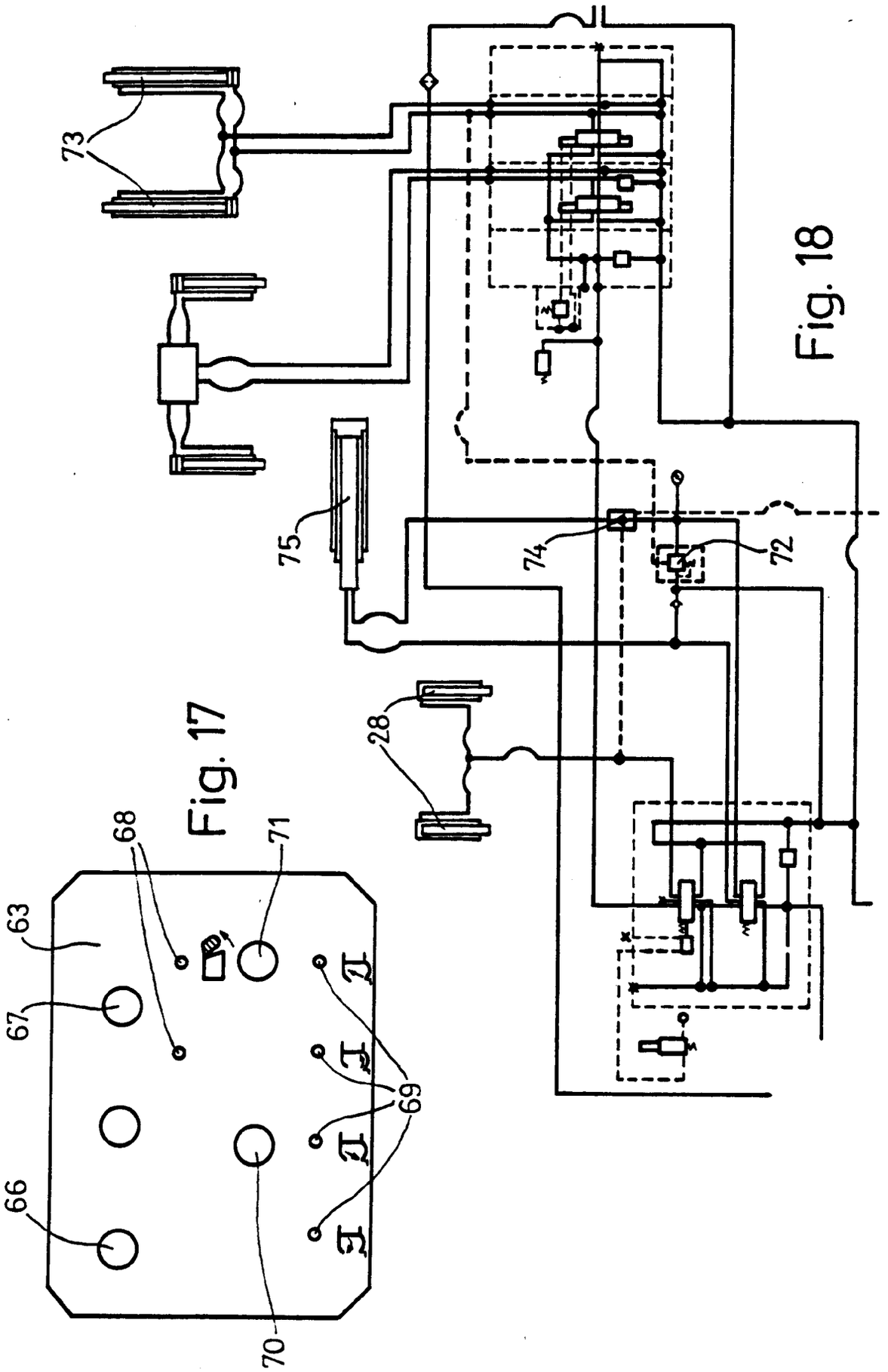

Fig. 17

Fig. 18

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 93 50 0093

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)
Y A	GB-A-1 399 454 (SHELVOKE & DREWRY LIMITED) * the whole document *	1 2,7,8	B65F3/08 B65F3/28
Y A	US-A-5 007 786 (J. BINGMAN) * column 12, line 37 - line 68 * * figures 2B,5 *	1 4	
A	GB-A-839 218 (H. ZÖLLER) * the whole document *	1,2	
A	DE-A-2 630 440 (SOLLINGER HÜTTE GMBH) * page 7, line 19 - page 8, line 2 * * figure 1 *	2,5,6	
A	GB-A-2 071 604 (SARGENT INDUSTRIES INC) * figures 1,2,14A,15,17 *	7-11	
A	US-A-3 734 316 (S. WORTHINGTON) * column 3, line 29 - line 49 * * figure 1 *	12,13	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B65F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	01 OCTOBER 1993	SMOLDERS R.C.H.

CATEGORY OF CITED DOCUMENTS

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