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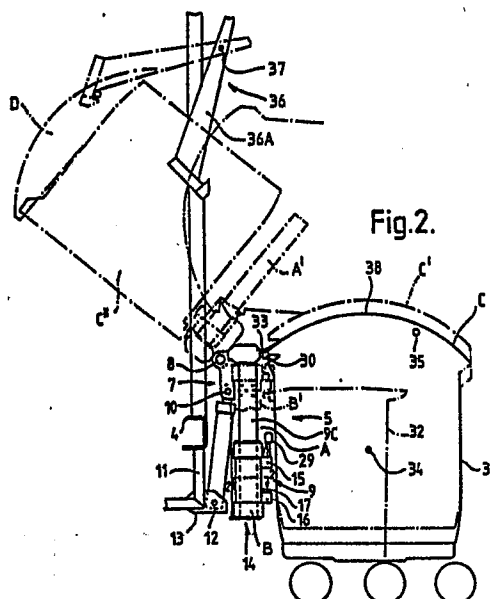
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54 Container handling apparatus.

57 Container handling apparatus is for enabling a variety of containers, primarily for refuse, to be unloaded into a vehicle or other large receiving container.

The apparatus includes a tipping frame 9 which is pivotable about a horizontal axis 8 to tip the containers 6. A lift carriage 14 is mounted on the tipping frame 9 for movement relative to the tipping frame and pick up means 29, 33 picks up the containers during movement of the lift carriage.

The lift carriage 14 effects a sliding movement relative to the tipping frame 9, preferably by means of a scissors linkage 24 to amplify the movement of a drive cylinder 19.



Container Handling Apparatus

This invention relates to container handling apparatus in particular to apparatus for lifting and tipping containers, primarily used for the transport and disposal of waste and waste products, in order that  
5 their contents can be discharged into a collecting vehicle.

Conventionally there exists a range of containers with volumes of 120, 240, 600 and 1,100 litres, which have hitherto been used extensively on the Continent, and  
10 conventionally there exists refuse collecting vehicles normally with a rear collecting hopper, which may contain a mechanism for compacting the waste loaded into the hopper and for compressing it into the main body. An object of the invention is to  
15 provide a mechanism for lifting the said containers and tipping them such that their contents are discharged into the loading hopper of the said collecting vehicle.

According to the invention apparatus for handling  
20 containers comprises a tipping frame pivotally supported for pivoting by first drive means about a generally horizontal axis, a lift carriage mounted on the tipping frame for movement relative to the frame, pick up means on the lift carriage for picking up a  
25 container, and second drive means interconnecting the tipping frame and the lift carriage for effecting said relative movement and picking up and lifting the container off the ground, which relative movement includes a relative sliding movement between the  
30 tipping frame and the lifting carriage.

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Preferably the second drive means includes a linkage and a piston and cylinder, operation of the piston and cylinder effecting a rectilinear, reciprocal movement of the lifting carriage relative to the tipping frame.

- 5 Conveniently the linkage includes a scissors linkage having a pair of pivotally connected links to amplify the movement of the piston and cylinder.

10 The links may each be cranked with one end connected to the lifting carriage and the other end to the tipping frame, the pivot between the links being connected to the piston and cylinder of the second drive means.

15 The apparatus may comprise at least one lift arm carried on the lift carriage and extending outwardly therefrom to engage under the container and to pick up the container when the lift carriage is moved upwards relative to the tipping frame. In the case in which the lift arm is to be selectively usable the lift arm is movable out of said outwardly  
20 extending operative position to an inoperative position.

In addition the apparatus may comprise at least one gripping arm mounted on the tipping frame and extending outwardly to hook over an upper end of  
25 the container when the container is lifted by the lift arm on the lift carriage and the gripping arm may be movable between the outwardly extending, operative position and an inoperative position, in the case in which the gripping arm is to be  
30 selectively usable.

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An embodiment of the invention is described below with reference to the drawings wherein:

Fig. 1 is a side elevation of a refuse collecting vehicle with a lifting/tipping mechanism fitted to  
5 the rear collecting hopper,

Fig. 2 is a side elevation of the lifting/tipping mechanism of Fig. 1,

Fig. 2A is a section on the line 2-2 in Fig. 2,

Fig. 3 is a rear view of the lifting/tipping mechanism  
10 of Figs. 1 and 2,

Fig. 4 is a rear view, corresponding to Fig. 3, of a lifting/tipping mechanism to which is added container engaging devices, some of the constructional features of Fig. 3 having been omitted for clarity,

15 Fig. 5 is a side elevation of the mechanism of Fig. 4,

Fig. 6 is a plan view of the mechanism of Fig. 4,

Fig. 7 is a section on the line 7-7 in Fig. 4,

20 Fig. 8 is a longitudinal cross-section through part of the mechanism of Figs. 4-7,

Fig. 9 is a side elevation of another part of the mechanism of Figs. 4-7, and

Fig. 10 is a partially sectioned end view of the part shown in Fig. 9.

Referring to the drawings and firstly to Figs. 1-3 a commercial vehicle chassis 1 is fitted with a body 2, on the rear of which is mounted a collecting hopper 3, in which, normally, is a powered compacting  
5 mechanism (not shown). Provision exists for loading the rear collecting hopper with material over a rearmost rail 4. Mounted on the rail 4 is the lifting/tipping mechanism 5 and, above the collecting hopper 3, is mounted a canopy 6.

10 The lifting/tipping mechanism 5 comprises a pair of pivot brackets 7 mounted on the rear rail 4 and projecting rearwardly and upwardly from the rail. Pivotally mounted on these brackets 7 by pivot pins 8 is a tipping frame 9 comprising a top crossmember 9A  
15 and a lower crossmember 9B which are interconnected by two upright side members 9C. Pivotally connected to the tipping frame 9 by pivot pins 10 are the piston rods of piston-in-cylinder devices 11, the lower ends of the cylinder being pivotally mounted  
20 by pivot pins 12 on mounting brackets 13 attached to the loading hopper. Extension of the piston-in-cylinder devices 11 causes the tipping frame 9 to rotate about the pivot pins 8 from an initial position A, shown in full lines, corresponding to the  
25 initial lift position, to a position A', shown in dotted lines, corresponding to the final tipped position.

A lift carriage 14 comprises a pair of substantially horizontal crossmembers 15 and 16 interconnected by  
30 two upright channel sections 17, the channel sections being disposed in such a manner that each partially encloses one of the upright side members 9C of tipping frame 9, thus permitting the lift carriage to

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slide up and down the tipping frame between an initial position B (Fig. 2), shown in full lines and a final lift position B', shown in dotted lines. Anti-friction pads 18 (Fig. 2A) are preferably fitted  
5 between the inner faces of the channel sections 17 and the tipping frame upright side members 9C to provide a smooth sliding action.

Means are provided, preferably in the form of a piston-in-cylinder device 19 (Fig. 3) to power the  
10 movement of the lift carriage 14 along the tipping frame 9. The range of containers to be handled vary in volume and height, thus the lift carriage 14 must have a range of movement to enable it to engage with containers at varying heights. Some additional travel  
15 is also required to cater for uneven ground conditions and vehicle suspension deflection. If a piston-in-cylinder device were used to provide a direct drive for this carriage stroke, then its overall length would be comparatively large; and this length  
20 would be reflected in the overall height of the tipping frame 9. If a frame 9 becomes too tall then the ground clearance behind the vehicle is diminished and the top rail 4 becomes too high to permit convenient hand loading of bagged rubbish and  
25 conventional domestic dustbins. Therefore an amplifier linkage is provided as the interconnecting mechanism between the piston-in-cylinder device 19 and the lift carriage 14. This amplifier linkage has the added advantage of converting a single actuator  
30 input into a balanced dual output, thus providing a square, even lift to the lift carriage.

The piston-in-cylinder device 19 is rigidly mounted at the lower end of its cylinder on the lower

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crossmember 9B of the tipping frame 9, with the piston rod extending upwardly. Adjacent to the intersection of the tipping frame uprights 9C and top crossmember 9A are fitted plates 20 in which is a substantially horizontal slot 21. Engaging with the slots 21 are rectangular bearing blocks 22, the bearing blocks being free to move along the slots 21. Pivotally mounted on the centre of the bearing blocks 22, through pivot pins 23, are cranked links 24, the links 24 extending transversely across the tipping frame. At a median point of the links 24 a pivot pin 25 engages the two links and is secured to the upper end of the piston rod of the piston-in-cylinder device 19. On each link 24 at the opposite end to the pivot pins 23 are mounted spherical rod ends 26 which in turn are connected via screwed rods 27 and lower spherical rod ends 28 to the lower crossmember 16 of the lift carriage 14. Thus, as the piston-in-cylinder device 19 is extended or retracted pivot pin 25 rises to position 25' and falls on a substantially vertical line, the transverse links 24, working with a scissor type action, pivot about pivot pins 25 and 23, the bearing blocks 22 slide to and fro in their slots 21 and the lift carriage, via the drive from the spherically ended rods 27, rises up to positions 15', 16' or runs down the tipping frame 9. Due to the linkage 24 the movement of the piston rod of device 19 is amplified in effecting movement of the lift carriage 14.

Arranged along the upper face of the lift carriage top crossmember 15 is a row of upwardly pointing fingers 29 (only two of which are shown in Fig. 2), the upper profile of the fingers being such as to permit engagement with a formed inverted channel

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lifting rail 30 (Fig. 2) on the upper front lip of the container to be emptied.

In Fig. 2 two alternative sizes of container are shown, a container 31 being a larger volume than a container 32. In operation the container 31 is pushed on its castor wheels up to the rear face of the lift/tip mechanism to position C shown in full lines. The piston-in-cylinder device 19 is energised and the lift carriage rises up the tipping frame 9. As the lift carriage rises the fingers 29 engage with the container lifting rail 30 and lift the container upwards until the top face of the rail 30 abuts a flange 33 on the top crossmember 9A of the tipping frame 9, the container then having reached position C'. The piston-in-cylinder devices 11 are then energised and the assembly of tipping frame 9, lift carriage 14 and the container 31 rotate as a whole about pivots 8 to the tipped position C'', an abutment rail (not shown) engaging with the lower front face of the container. Reversing the procedure will return the container to the ground.

The larger volume container 31 is fitted with a lid 38 which is, when viewed from the side, of curved profile and is pivoted to the container body by pins 34. The lid has a pair of outwardly extending abutments 35. Carried, pivotally, on the canopy 6 is a frame assembly 36 (Fig. 2) comprising two spaced, elongated hook-shaped side members 36A, interconnected by a crossbar, and pivoting about pins 37. The members 36A are biased by springs (not shown) towards an anti-clockwise direction, such movement being limited by abutments (not shown) so that they extend

substantially vertically downwards. As the container 31 rotates from the lifted position C' to the tipped position C'' the lid abutments 35 engage with the hooks 36A of the frame 36 causing the lid 38 to  
5 rotate about pins 34 into an open position D.

In an alternative method of location to the vertical slides between the tipping frame and the lift carriage, as described, the lower end of the lift carriage could be pivotally mounted on a sliding block engaging the  
10 tipping frame upright 9C and the upper end of the lift carriage 14 could be connected to the tipping frame 9 via a pair of pivoted links such that when viewed from the side a 'slider crank' mechanism is formed. This mechanism would enable the fingers 29  
15 to rise in a curved arc, lifting and drawing in the container to its abutment on the tipping frame.

It will be appreciated that the lift fingers 29 on the lift carriage may be replaced, modified or augmented by additional features to enable containers of various  
20 forms to be handled.

Reference is now made to Figs. 4-10 in which one such modification is made. In the Figs. 4-10 embodiment the main lifting/tipping mechanism as described in relation to Figs. 1-3 remains, although parts are  
25 omitted from Figs. 4-10 for clarity. In Figs. 4-10 the same reference numbers are used for the same parts as shown in Figs. 1-3.

The arrangement of Figs. 4-10 is to enable the mechanism to operate with a form of refuse container  
30 consisting of a cylindrical body having dimensions of

the order of one metre in diameter and one and a half metres high. Such containers are designed to be lifted by engagement of lifting arms under the container, the upper edge of the container being gripped  
5 during lifting.

In Figs. 4-7 there is shown lifting arms or forks 50 for engaging under a cylindrical container 39, the full lines indicating the forks in a lifted position.

10 The forks 50 are generally L-shaped each having a horizontally-directed portion 43 and a circular section vertical portion or shaft 44. The shafts 44 are each free to rotate and to move axially in  
15 bearings 46 located in the horizontal lower cross members 9B of the tipping frame 9. The upper ends of the shaft 44 are connected by bearing assemblies 47 to trunnion assemblies 45 which are rigidly  
20 mounted on the carriage lift assembly 14. Thus the shafts 44 are raised and lowered by vertical movement of the lift carriage, as described in relation to Figs. 1-3, and the portions 43 are raised and lowered with the shafts 44.

The horizontal portions 43 are movable from the rearwardly-extending full line position (Fig. 7)  
25 towards a parked, inoperative position 43'. In the rearwardly-extending position the portions 43 abut each other over surfaces 48 and in the inoperative position 43' over surfaces 49.

The forks 50 are moved between the inoperative and  
30 operative positions manually by means of a linkage (not shown) or, under power, by a piston and cylinder (not shown).

At the upper end of the tipping frame are mounted two vertical shafts 42 which each rotate and move axially within the vertical legs 9C of the frame 9. The upper ends of the shafts 42 each carry a rigidly mounted pick up arm 40 which extends horizontally and which

5 pivotally supports hooks 41. The arms 40 can adopt an operative, raised position extending rearwardly (shown in full lines) or a sideways-extending lowered position 40' in which the arms are inoperative.

10 Fig. 8 shows the means by which each arm 40 is raised, lowered and rotated. The shaft 42 locates in a bore of a guide tube 52 mounted in the side member 9C of the frame 9. A helical slot 58 is formed at the lower end of the tube 52 and a pin 51 carried on the

15 shaft 42 locates in the slot 58 so that when the shaft 42 is moved along and relative to the tube 52 the shaft also rotates relative to the tube 52. The lower end of the shaft 42 carries an abutment ring 54 which abuts the lower end of the tube 52 when the shaft is in

20 its raised position. The shaft 42 is moved along the tube 52 by a double-acting piston and cylinder device 56 which at one end is fixed to the shaft 42 by a pin 55 and is secured at its other end to the side frame member 9C by a pivot bracket 57.

25 Extension of the piston in the cylinder 56 causes the shaft 42 to cause the arm 40 to rise and move from a lowered position to a raised and rearwardly directed, operative position.

Figs. 9 and 10 show means for gripping the upper edge

30 of a container 39, such means including a hook 41 having a downwardly-directed tang 41A. The hook 41 is pivotally connected to each arm 40 through a pivot

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60 and is free to move from a full line position, as shown, to position 41' and is biased towards position 41' by a tension spring 61 which interconnects the hook 41 and the arm 40. As shown, a top edge  
5 of the container 39 is engaged with the hook 41, the hook being moved to the full line position against the spring bias during a container lifting operation.

To lift and tip a cylindrical container 39 the forks 43 are moved to their operative position from  
10 position 43' and the cylinder 19 is retracted to lower the forks towards the ground via the bearing 47.

The cylinders 56 are then extended to cause the arms 40 to lift and rotate from position 40' towards the operative position, the hooks 41 being in position  
15 41' under the action of the spring 61 to receive the top edge of the container 39.

The container 39 is mounted on wheels 59 and is pushed towards the lifting/tipping mechanism until a vertical portion 40A of the arms is engaged.

20 The cylinder 19 is extended to lift the forks 43 and the forks engage under the base of the container 39 to lift the container until the top edge engages the hooks 41 and causes the hooks to pivot about pivots 60 until further pivoting is prevented by abutment of faces 63.

25 The container 39 is now firmly locked between the hooks 41 and the forks 43 and can be tipped, as described in relation to Figs. 1-3, towards the tipped position G'' by extension of the cylinders 11. After emptying of the container the container is  
30 lowered and released by the reverse procedure.

Although there is described and shown lifting and tipping apparatus for use on vehicles it will be appreciated that the apparatus can equally be applied to static installations in which containers  
5 are discharged into a larger receiving hopper associated with a packing mechanism.

Claims

1. Apparatus for handling containers comprises a tipping frame pivotally supported for pivoting by first drive means about a generally horizontal axis, a lift carriage mounted on the tipping  
5 frame for movement relative to the frame, pick up means on the lift carriage for picking up a container, and second drive means interconnecting the tipping frame and the lift carriage for effecting said relative movement and picking up and lifting  
10 the container off the ground, which relative movement includes a relative sliding movement between the tipping frame and the lifting carriage.
2. Apparatus according to claim 1 wherein the second drive means includes a linkage and a  
15 piston and cylinder, operation of the piston and cylinder effecting a rectilinear, reciprocal movement of the lifting carriage relative to the tipping frame.
3. Apparatus according to claim 2 wherein the  
20 linkage includes a scissors linkage having a pair of pivotally connected links to amplify the movement of the piston and cylinder.
4. Apparatus according to claim 3 wherein the links  
25 are each cranked with one end connected to the lifting carriage and the other end to the tipping frame, the pivot between the links being connected to the piston and cylinder of the second drive means.
5. Apparatus according to any one of the preceding

- claims wherein the gripping means includes gripping fingers mounted on the lift carriage and an abutment on the tipping frame whereby upon lifting of the lift carriage relative to the tipping frame the container is engaged by the fingers and is gripped between said fingers and said abutment.
- 5
6. Apparatus according to any one of the preceding claims comprising at least one lift arm carried on the lift carriage and extending outwardly therefrom to engage under the container and to pick up the container when the lift carriage is moved upwards relative to the tipping frame.
- 10
7. Apparatus according to claim 6 wherein the lift arm is movable out of said outwardly extending operative position to an inoperative position.
- 15
8. Apparatus according to claim 6 or 7 comprising at least one gripping arm mounted on the tipping frame and extending outwardly to hook over an upper end of the container when the container is lifted by the lift arm on the lift carriage.
- 20
9. Apparatus according to claim 8 wherein the gripping arm is movable between the outwardly extending, operative position and an inoperative position.
- 25
10. Apparatus according to claim 9 wherein said inoperative position of the gripping arm is below and to the side of the operative position and said movement is effected by reciprocal drive means.
- 30

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11. Apparatus according to claims 8, 9 or 10 wherein  
the gripping arm includes a resilient hook member  
movable from a receiving position for receiving  
the upper end of the container towards a gripping  
position against the bias of spring means.
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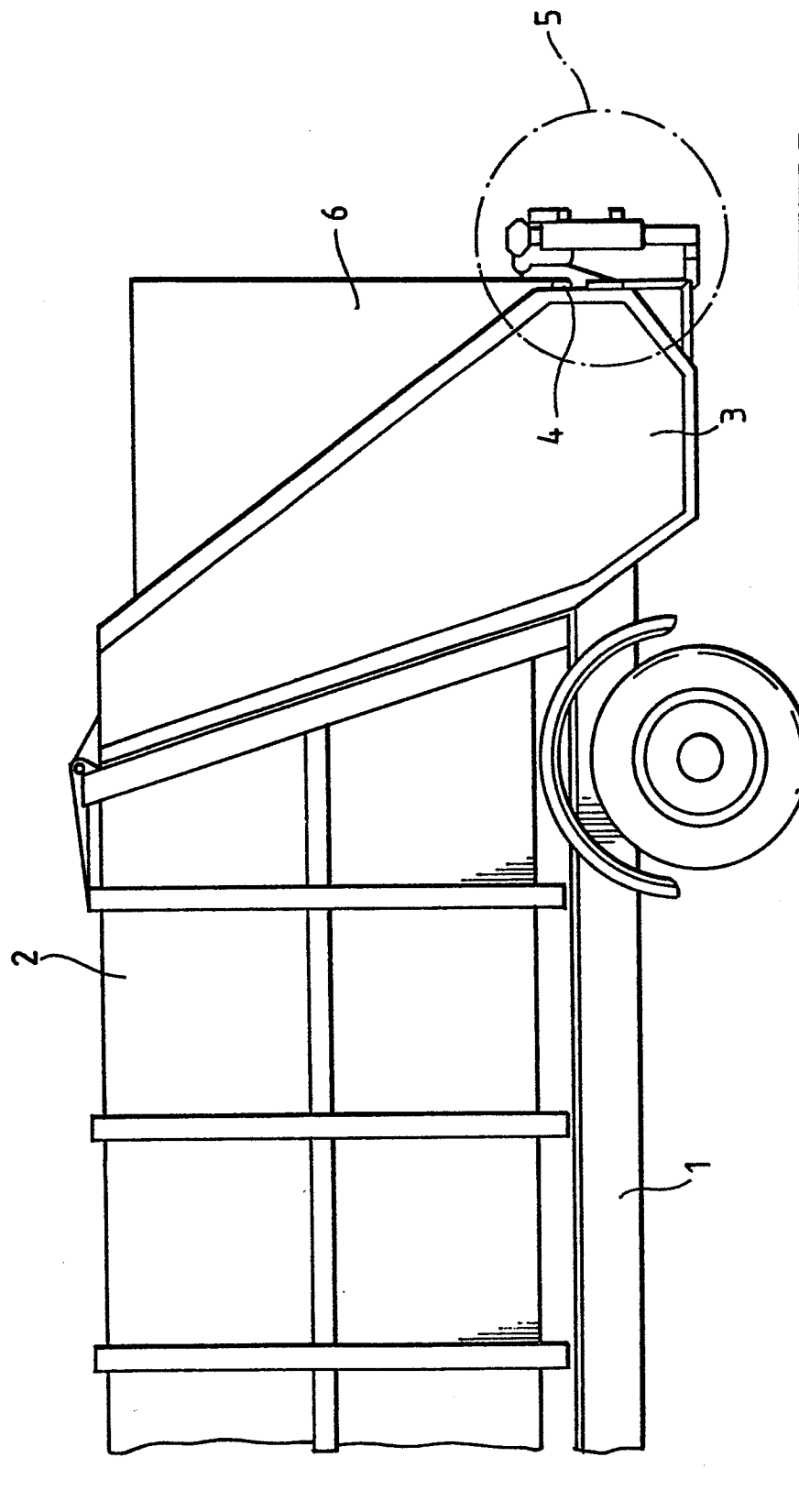
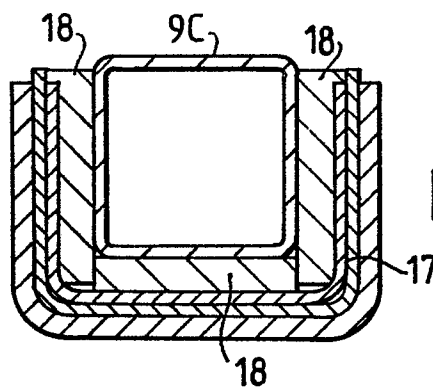
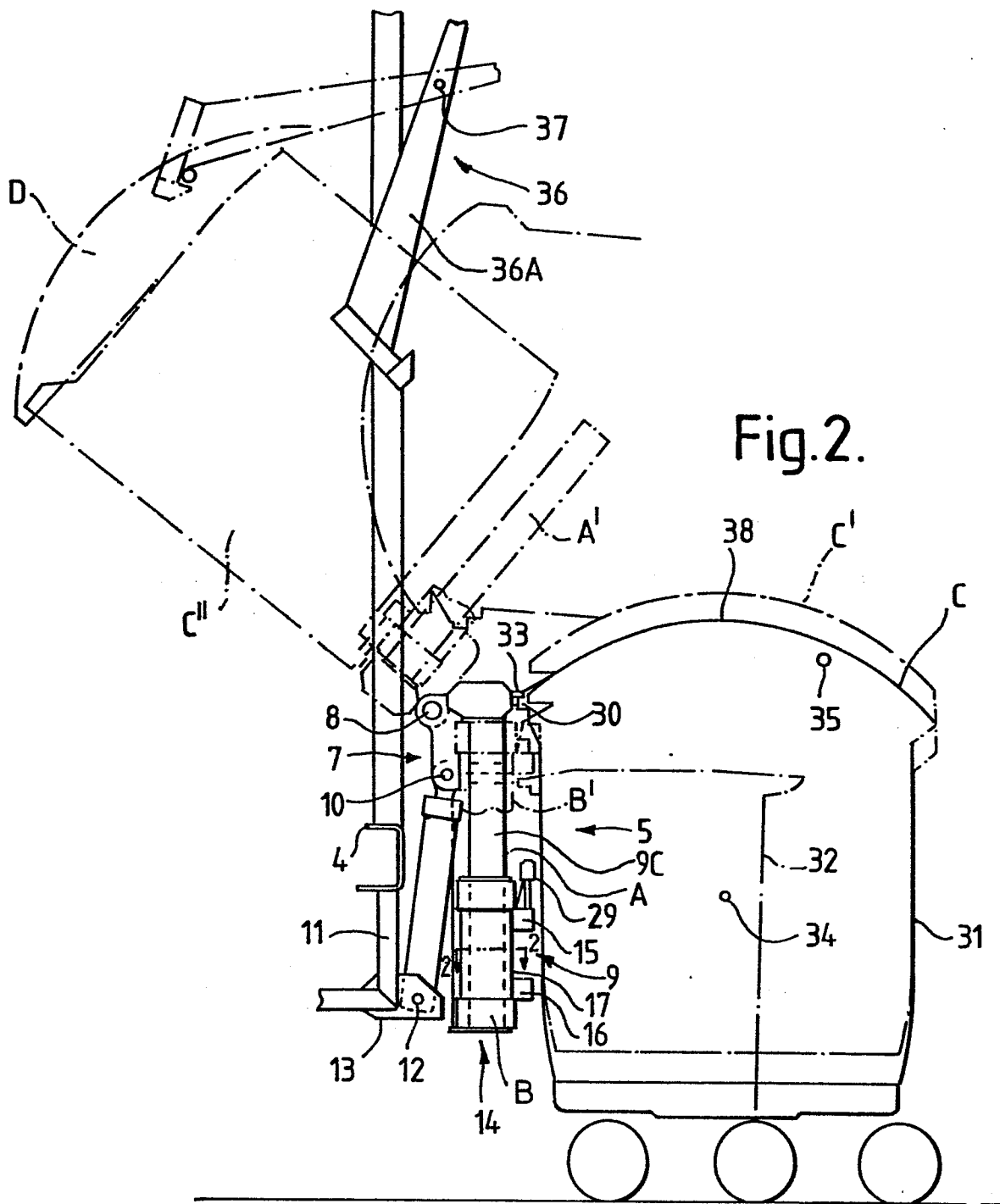
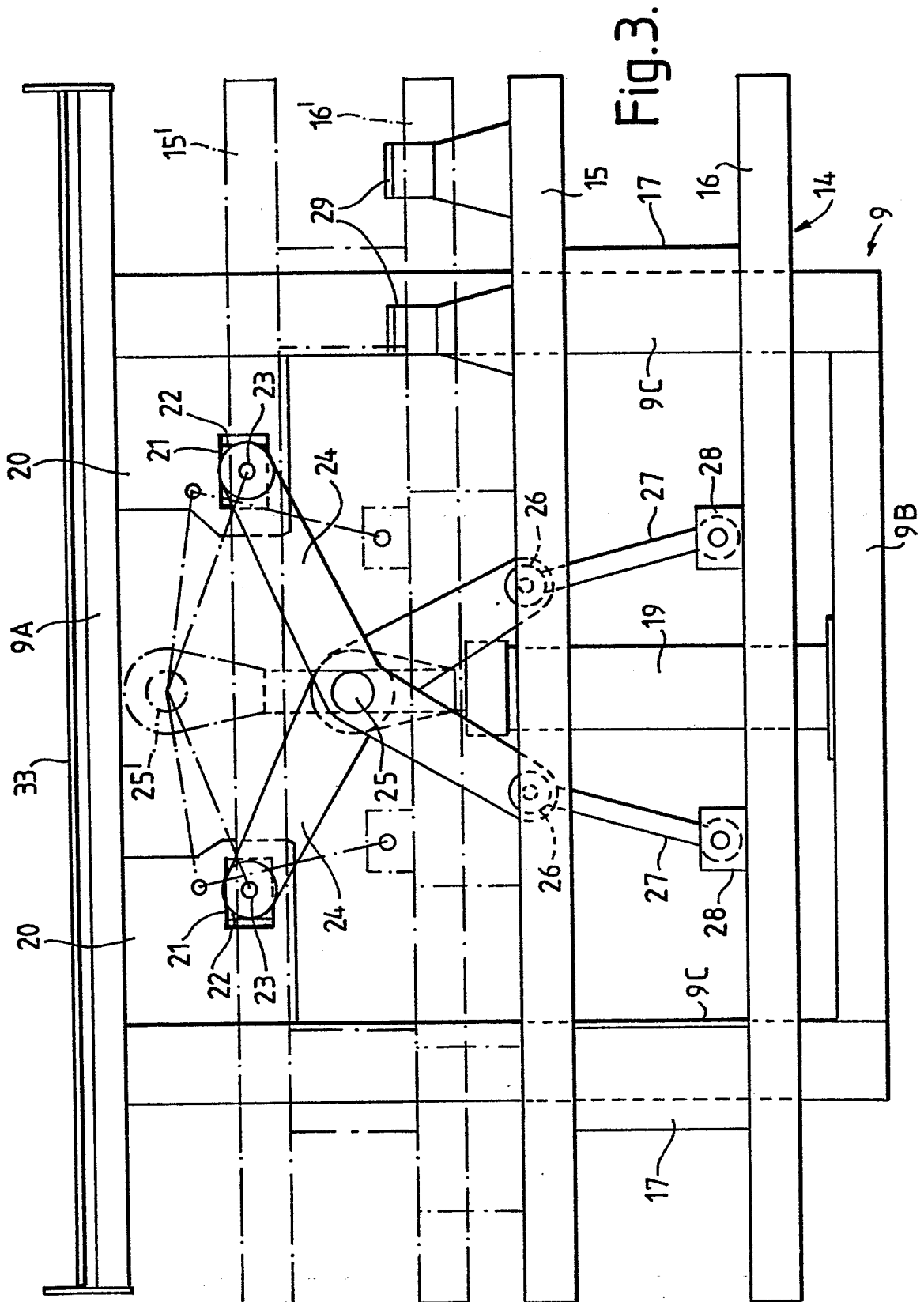


Fig.1.





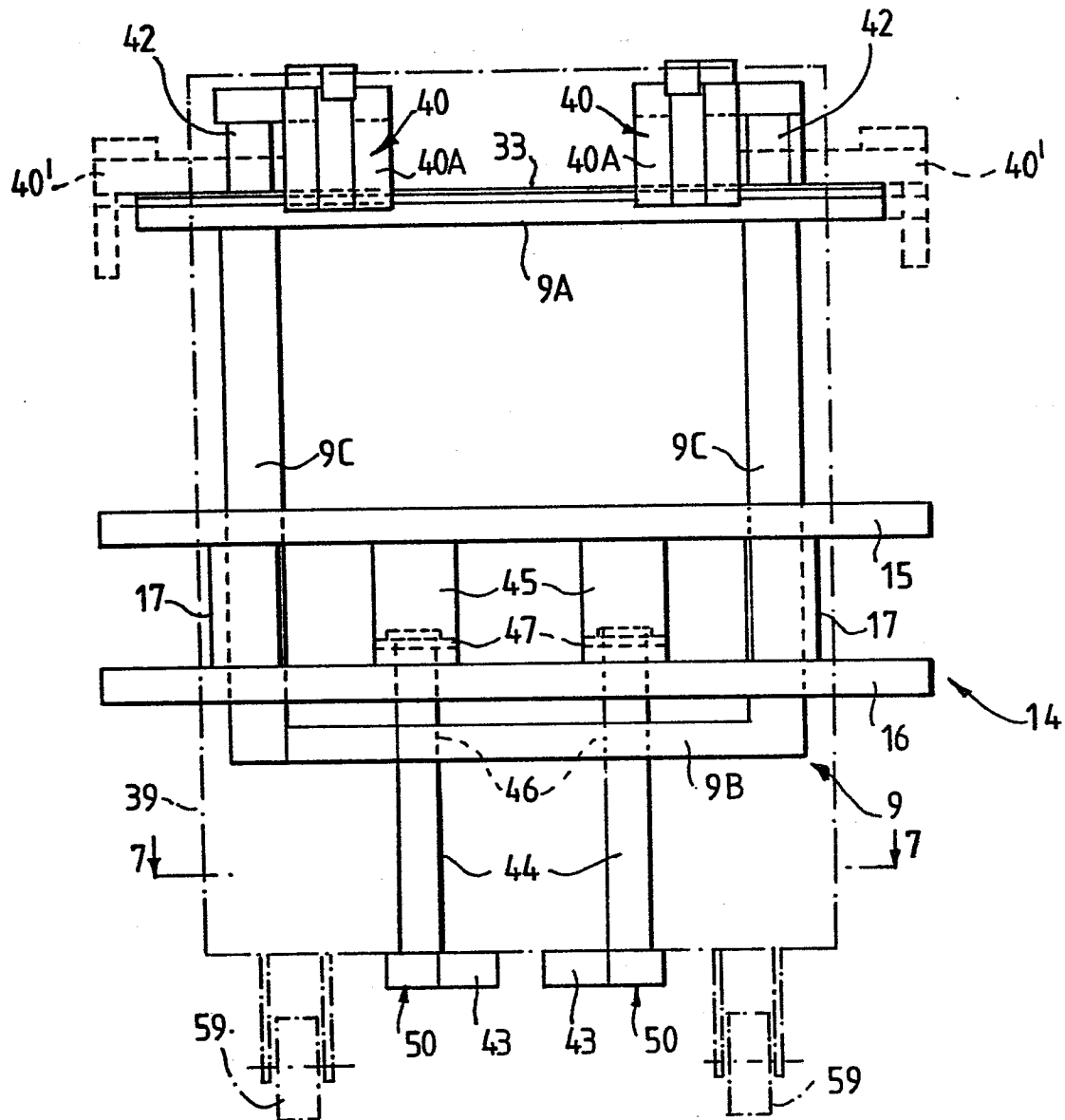


Fig.4.

Fig.5.

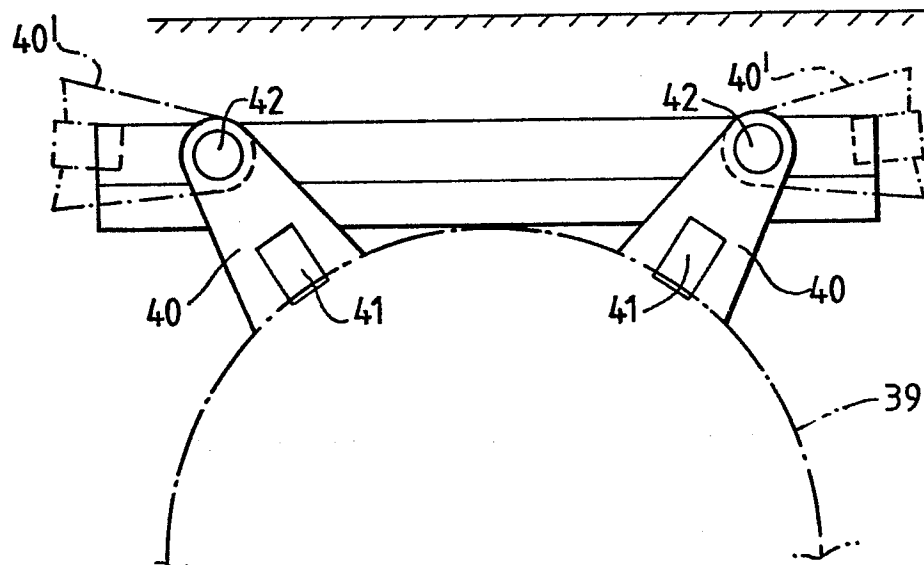
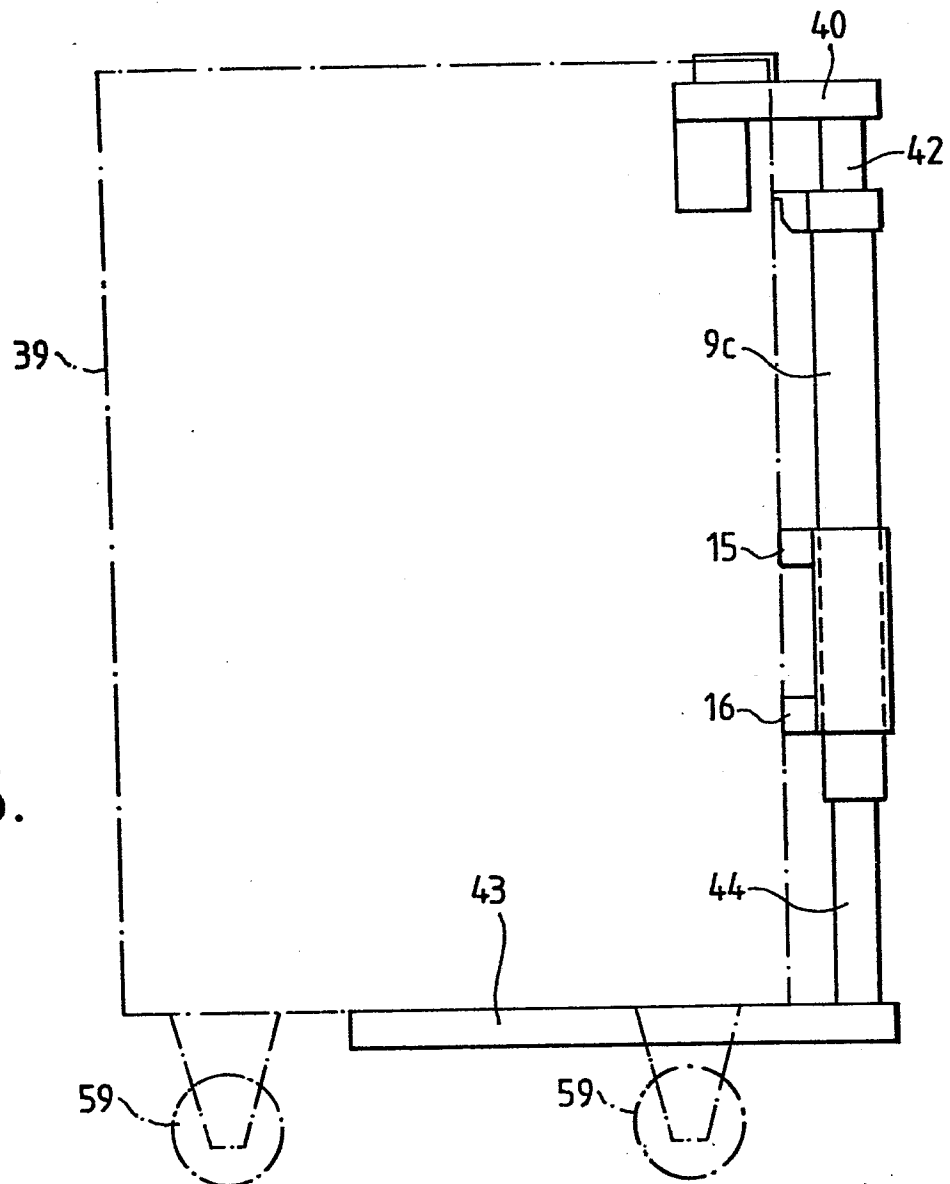


Fig.6.

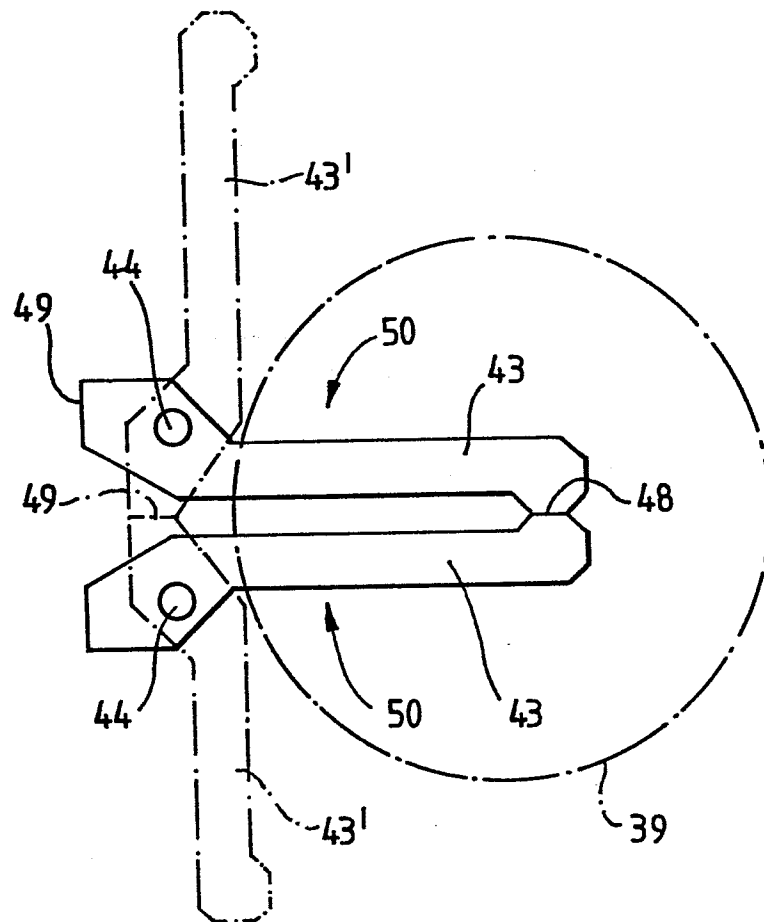


Fig.7.

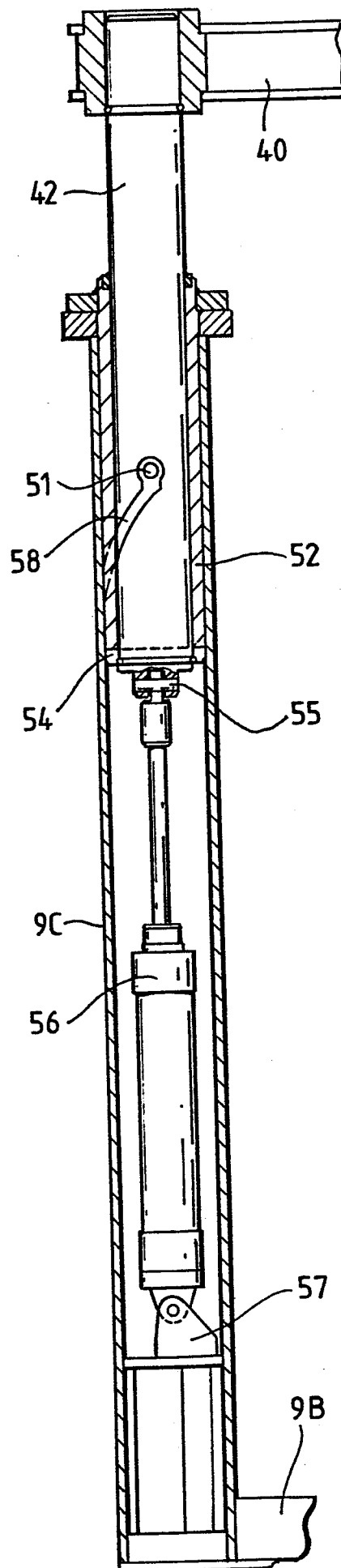


Fig.8.

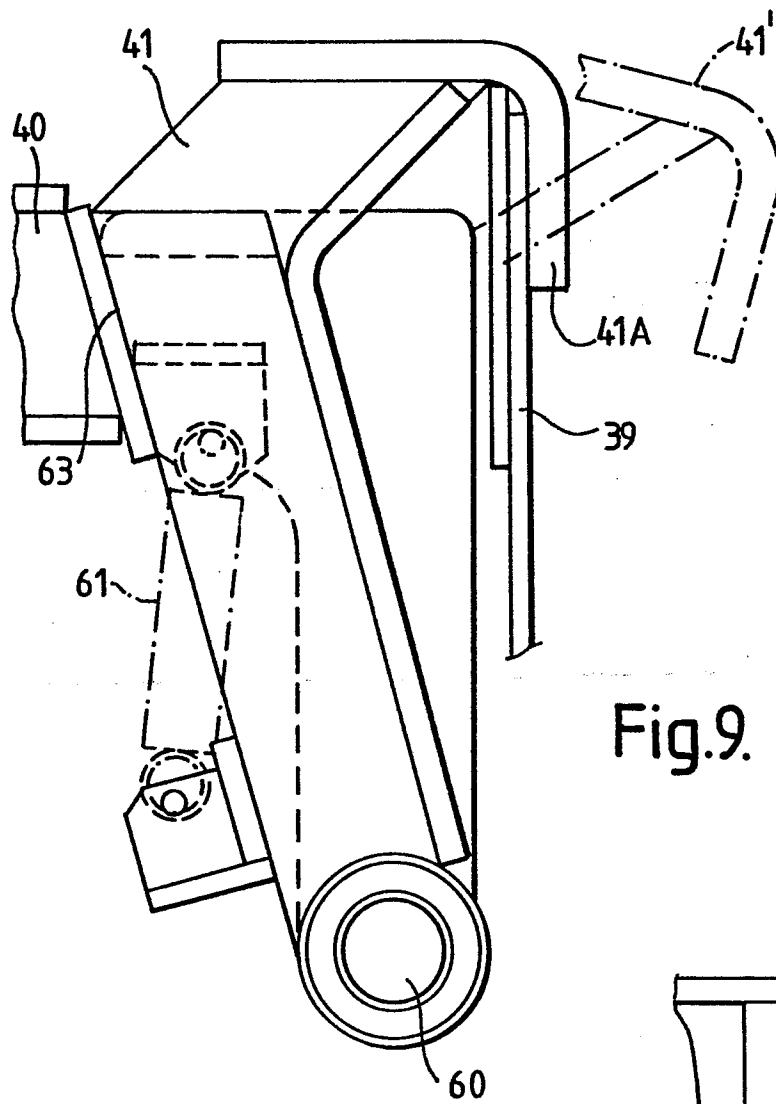


Fig.9.

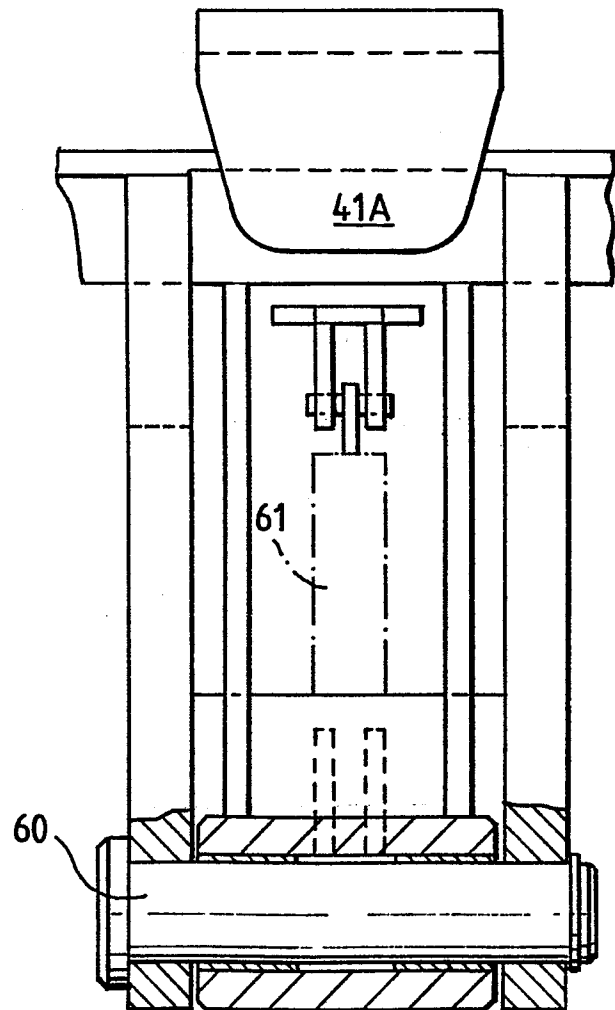


Fig.10.



| 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. <sup>3</sup> ) |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | GB-A-1 579 830 (GLOVER WEBB & LIVERSIDGE)<br>* page 1, line 87 - page 2, line 10; page 2, lines 28-40; page 2, lines 65-81; figures 1,2 | 1,2,6                                          | B 65 F 3/04                                                |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | GB-A-2 092 094 (HESTAIR EAGLE)<br>* page 2, lines 27-72; figures 1,4-6 *                                                                | 1,2,6-9                                        |                                                            |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | WO-A-8 201 342 (NÄRTRANSPORTDON)<br>* claim 1; figure *                                                                                 | 2-4                                            |                                                            |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | FR-A-2 459 768 (SEMAT)<br>* page 3, line 40 - page 4, line 3; page 4, lines 8-14; figures 1,6,7 *                                       | 5                                              | TECHNICAL FIELDS SEARCHED (Int. Cl. <sup>3</sup> )         |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | FR-E- 51 774 (DAIMLER-BENZ)<br>* page 4, lines 53-59; figures 13,14 *                                                                   | 10                                             | B 65 F 3/00<br>B 65 G 65/00<br>B 66 F 7/00<br>B 66 F 9/00  |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | US-A-1 763 499 (BOLGER)<br>* page 2, lines 55-72; figures 13,14 *                                                                       | 11                                             |                                                            |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | FR-A-1 020 503 (LINDE)<br>* page 2, left-hand column, lines 2-6; figure 1 *                                                             | 11                                             |                                                            |
| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                         |                                                |                                                            |
| Place of search<br>THE HAGUE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                         | Date of completion of the search<br>25-09-1984 | Examiner<br>OSBORNE J.                                     |
| <p><b>CATEGORY OF CITED DOCUMENTS</b></p> <p>X : particularly relevant if taken alone<br/>Y : particularly relevant if combined with another document of the same category<br/>A : technological background<br/>O : non-written disclosure<br/>P : intermediate document</p> <p>T : theory or principle underlying the invention<br/>E : earlier patent document, but published on, or after the filing date<br/>D : document cited in the application<br/>L : document cited for other reasons<br/>&amp; : member of the same patent family, corresponding document</p> |                                                                                                                                         |                                                |                                                            |