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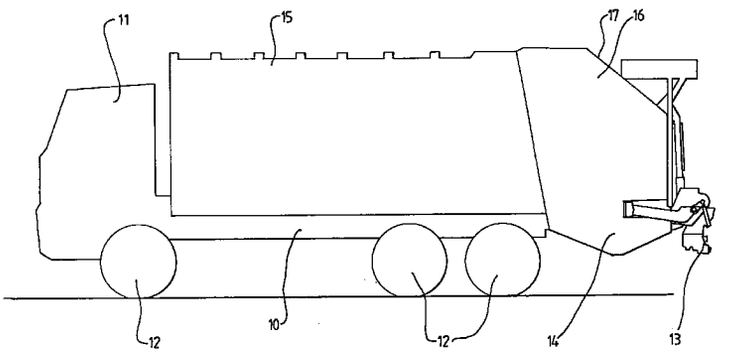
(54) Refuse handling system

(57) A refuse handling system comprising a charge hopper (14) to receive refuse loaded into the charge hopper from a refuse collection container which is raised and tipped by a hoist (13) operable by a manually operable control means, and in which a compactor mechanism (16) is provided to perform a compaction cycle to transfer refuse from the charge hopper so that it is stored and compacted in a storage body (15) in which the control means comprises a manually operable control input device (44-47) for the hoist which is also adapted to cause operation of the compactor to perform a compaction cycle.

FIG 1



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Description

This invention relates to a refuse handling system comprising a charge hopper to receive refuse loaded into the charge hopper from a refuse collection container which is raised and tipped by a hoist operable by a manually operable control means, and in which a compactor mechanism is provided to perform a compaction cycle to transfer refuse from the charge hopper so that it is stored and compacted in a storage body. Such a system is referred to as being of the "kind specified".

Hitherto the hoist has been operated and the compactor has been operated by a control means having separate manually operated control input devices for the hoist and compactor respectively. A continuous manually maintained signal is required for the compactor to continue over at least a part of the compaction cycle, herein referred to as a "hold to run" input.

An object of the present invention is to provide an improved control means.

According to a first aspect of the present invention we provide a refuse handling system of the kind specified wherein the control means comprises a manually operable control input device for the hoist which is adapted to operate the compactor to perform a compaction cycle.

Said input device may comprise means to enable the compactor to operate to perform a compaction cycle whilst the hoist is in motion and, when the hoist is stationary after being lowered to a predetermined lowered position, the compactor may be permitted to complete a current compaction cycle.

The system may comprise means whereby the compactor is enabled to operate to perform a compaction cycle provided that the hoist control device is operated by an operator.

The system may comprise means whereby when the hoist is at or within a predetermined distance from an uppermost predetermined position, i.e. maximum raise zone, a signal to allow continued compactor operation to perform a compaction cycle is provided thereby allowing an operator to release the control device for the hoist so that whilst hoist movement is caused to cease the controller is signalled both for run mode and cycle initiation of the compactor whereby the compactor will perform a plurality of compaction cycles continuously until manual operation of the hoist control input device causes the hoist to be lowered out of the maximum raise zone whereupon control reverts to operator control.

The system may comprise means whereby when, during lifting or lowering of the hoist, operator release of the control input device for the hoist occurs;

i) the compactor is caused to stop performing a compaction cycle unless the hoist is in said maximum raise zone, whereupon continual repeat of a compaction cycle is provided or

ii) when the shield and blade have passed through a predetermined "pinch point" zone in which the compactor approaches a fully extended position which it is closest to a wall of the charge hopper, the compactor is allowed to complete the current compaction cycle.

The system may comprise means whereby upon reoperation of the hoist control input device by the operator, operation of the compactor in a compaction cycle is re-initiated so that it continues with its normal packing cycle. It starts the cycle depending upon the position at which the compactor movement was arrested.

The system may have a joy stick type operator control input device and the hoist controls may be such that when the hoist is at a minimum height the compactor mechanism will complete a current compaction cycle and stop at a park position. That is to say, continuous cycling of the compactor with the hoist in a down position is prevented.

Means may be provided whereby the compactor is caused to perform a compaction cycle by operation of a compactor "hold to run" input separate from the hoist input. The present invention enables an operator to "feed" the hoist and the compactor as they and their operation situation allows or requires and to ensure that the charge hopper is regularly emptied of material whilst the hoist is operated in a safe manner.

The compactor may comprise a shield pivotally connected to one end of an upper arm means and to one end of a lower arm means, the other ends of the arm means being pivotally connected relative to the charge hopper about spaced axes, and a blade pivotally connected to the shield at or adjacent a lower end of the shield and drive means to move the shield and the blade about said pivotal connections in a compaction cycle.

According to a second aspect of the invention we provide a method of operating a refuse handling system of the kind specified comprising a system of manually operating a control input device for the hoist and which also causes operation of the compactor to perform a compaction cycle.

The system of manually operating a control input device may comprise operating the control input device to provide a "raise" input or a "down" input to raise or lower the hoist respectively, or to provide no input, and may further comprise operating the control input device to provide a "raise" input or a "down" input and to cause the compactor to perform a compaction cycle.

The system of manually operating a control input device may comprise operating the control input device to provide a "raise" input such that the hoist is raised to or within a predetermined distance from an uppermost predetermined position, ie. a maximum raise zone, wherein the compactor performs a plurality of compaction cycles continuously even when no input is provided.

The system of manually operating a control input

device may comprise operating the control input device to provide a "down" input when the hoist is at a minimum height to cause the compactor means to complete a current compaction cycle and stop at a park position.

The system of manually operating a control input device may comprise operating the control input device to provide a "raise" input or a "down" input and then to provide no input;

i) to cause the compactor to stop performing a compaction cycle unless the hoist is at or within a predetermined distance from an uppermost predetermined distance from an uppermost predetermined position, whereupon continual repeat of a compaction cycle is provided, or
ii) when the compactor has passed through a predetermined "pinch point" zone in which the compactor approaches a fully extended position in which it is closest to a wall of the charge hopper, to allow the compactor to complete the current compaction cycle.

The control input device may comprise a first button operable to provide a "raise" input, a second button operable to provide a "down" input and where operating neither button provides no input.

Alternatively, the control input device may comprise a joystick biased to a spring load to neutral position wherein no input is provided, the joystick being moveable in a lifting direction to provide a "raise" input and in a lowering direction to provide a "down" input.

The method of operating a refuse handling system may comprise the step of causing the compactor to perform a compaction cycle by operation of a compactor "hold to run" input separate from the hoist input.

An embodiment of the invention will now be described by way of example with reference to the accompanying drawings, wherein:-

Figure 1 is a diagrammatic side elevation of a refuse collection vehicle embodying the invention with parts omitted for clarity;
Figure 2 is a fragmentary side elevation, to an enlarged scale of the vehicle of Figure 1 showing a compactor mechanism and hoist assembly thereof with the compactor mechanism in a "parked" condition and partly broken away for clarity;
Figures 3 to 5 are views similar to that of Figure 2 but showing the compactor mechanism and hoist at different positions in a cycle of operations thereof; and
Figure 6 is a diagrammatic illustration of an operating station of the vehicle of Figure 1.

Referring to the drawings a refuse handling system is illustrated mounted on a suitable vehicle chassis 10 having a cab 11 and ground engagable wheels 12. The refuse handling system comprises a hoist 13 for refuse containers which serves to lift a container and to tip the contents of the container into a charge hopper 14. The refuse deposited into the charge hopper 14 is transferred to and compacted in a storage body 15 by performance of a compaction cycle by a compactor mechanism 16. The charge hopper 14 and the associated compactor mechanism comprise a tailgate 17 on which the hoist 13 is carried.

If desired, the storage body, tailgate and hoist may, instead of being mounted on the vehicle chassis, be static being mounted on a suitable support structure on the ground.

Whilst it is preferred that the hoist mechanism is mounted on the rear of the tailgate, if desired it may be freestanding, when the storage body and tailgate are static.

Referring now to Figure 2, the bin hoist 13 comprises a container carrier 20 which is adapted to engage a refuse container in suitable manner either, for example, by clamping a comb structure 21 under a lip of a container in known manner or in any other desired way, for example, particularly where the container is cylindrical, by means of a pair of clamping arms which are actuated by hydraulic rams 22. The carrier 20 is pivotally connected to a head part 23 which is carried by a pair of arms 24 which are pivotally connected to the opposite sides of the tailgate 17 for pivotal movement about an axis 25. The head 23 is caused to pivot about the axis 25 by means of a pair of hydraulic cylinders 26 connected between an extension part 27 of the tailgate and the head 23 or in any other suitable way, for example by means of a suitable rotary actuator or motor.

The initial raising of a hoist by cylinders 26 engages the container with the hoist or sets it to a desired height. Continued lifting of the hoist causes the container to be lifted from the ground then clamped to the carrier, for certain containers by additional cylinders 22a or by a cam driven clamping device, not shown, in conventional manner. The manner in which a container or containers is secured to the hoist is not significant to this invention and any desired means may be used.

Lifting to the full height causes the contents of the container to fall into the charge hopper 14 whereupon the container is lowered to the ground by a reversal of the lifting sequence.

The compactor mechanism comprises a shield 30 which is pivotally connected, as shown at 31, at transversely spaced positions to the one ends of a pair of upper arms 32 and the one ends of a pair of lower arms 33. The other ends of the arms 32, 33 are pivotally connected to the tailgate for pivotal movement about transverse axes 34, 35.

Pivotally connected to the shield 30 for rotation about the axis 31 is a blade 36. The shield 30 is raised and lowered by means of a pair of shield hydraulic rams 37, a cylinder of each of which is pivotally connected at its lower end about the axis 31 and a piston of each of which is pivotally connected at its upper end to the tail-

gate about an axis 38.

The blade 36 is caused to pivot relative to the shield 30 by means of a further pair of blade hydraulic rams 39, a cylinder of each of which is pivotally connected to the blade 36 about a pivot axis 40 and a piston of each of which is pivotally connected to the tailgate about an axis 41.

The compactor mechanism starts a compaction cycle of operations from a parked position which is shown in Figure 2. Initially the blade 36 is moved to a raised position by rotating counter-clockwise about the axis 31 as a result of retraction of the blade rams 39. Such raised position is shown in Figure 3.

The shield 30 is then extended together with the blade 23 by extension of the shield rams 37 so that the compactor mechanism occupies the position shown in Figure 4.

The blade 36 is then lowered by rotating clockwise about the axis 31 as a result of extension of the blade rams 39.

Finally, the shield 30 and the blade 36 are retracted by contracting the shield rams 37 until the compactor mechanism occupies a parked position as shown in Figure 2.

This cycle of operations enables the compactor mechanism initially to be moved to the position shown in Figure 4 by passing over refuse charged into the charge hopper and then for the compactor mechanism to be operated to move the mass of refuse in the direction forwardly from the rear of the handling system so as to be transferred to and compacted in the storage body 11 as its compactor moves to the parked position shown in Figure 2 in which the shield 30 and blade 36 are retracted by retraction of the shield rams 37.

In use, the hoist and compactor are manually operated from an operating station, two of which are provided on opposite sides of the vehicle. Each operating station has a suitable control means mechanism comprising a manually operable control input device for the hoist and the compactor. In Figure 6 of the drawings it appears as illustrated as comprising two push buttons 46, 47 or an alternative of a joy stick 44, as illustrated. In either event pressing of a lower button 46 causes the hoist to be lowered whilst operation of another push button 47 causes the hoist mechanism to be raised or, alternatively, the hoist is lowered and lifted as a result of lowering or lifting of the joy stick 44. In addition, a further button 45 is provided to operate the compactor. Signals from the input devices are fed to a controller 50 which may comprise a programmable logic controller provided with a microprocessor and a memory device and programmed appropriately.

In use, it is to be assumed that the compactor mechanism and hoist are in a start condition and a lowered position respectively as illustrated in Figure 2. An operator will pivot the joy stick 44 in a lifting direction or press a push button 47 so as to provide a “raise” input to raise the hoist and initiate a cycle of operation of the compactor. This continues so long as the operator input is maintained to hold the button 47 inwardly or the joy stick, which is spring loaded to a neutral position, lifted.

If, at this stage, the "raise" input is removed raising of the hoist 24 will stop. However, compactor movement is dependent upon the position of the hoist.

If the hoist is stopped by release of the joy stick 44 or the raising button 47 during the part of the raising process during which it becomes engaged with a bin then the compactor mechanism will also stop, dependent upon the position of the compaction mechanism in the cycle.

When the hoist has reached an uppermost tipping position a signal to continue cycling of the compactor is provided by means of a sensor 48 which senses the presence of the hoist in or adjacent this position, i.e. in a maximum raise zone, so that the manual input provided by the joy stick 44 or the push button 47 is "paralleled" to the controller 50. The compactor will run continuously or for a predetermined number of cycles in this condition, i.e. with the hoist in its uppermost position. Only if the hoist is manually lowered out of the maximum raised position will the signal not be provided and operation of the compaction mechanism again put under the direct manual control of an operator.

A sensor 49 is provided to sense the presence of the hoist in a lowermost or adjacent a lowermost position to produce a signal to the controller 50. As a result, when the hoist is lowered to, or adjacent to, the lowermost position, by movement of the joy stick 44 to a lowering position, or by manual engagement of a button 46 and the operator “down” input is maintained thereby, the compactor is allowed to complete the current cycle of operations but it is not allowed to initiate another cycle.

Generally, during operation of the hoist by the operator the input provided according to the invention is equivalent to a "hold to run" signal conventionally provided from a separate compactor control input device while the compactor is in a shield extend condition and after an initial part of a blade down operation, i.e. during movement of the shield from the position shown in Figure 4 to the position shown in Figure 5

If operator input is removed by release of the button 46 or 47 or by permitting the joy stick 44 to adopt its "spring load to neutral" position the compactor mechanism operation will depend on the position of the hoist and the position of the compactor mechanism.

If the blade 36 is being raised from the position shown in Figure 2 to the position shown in Figure 3 the blade 36 will continue to raise to its maximum blade up position where it will stop and await another signal.

If the blade 36 has fully raised and shield extension has started, i.e. the start of movement from the position shown in Figure 3 to that shown in Figure 4 is occurring, the compactor mechanism will stop upon removal of the manual control input signal to await another signal.

If the bin hoist 20 has reached its maximum raise position so that a signal dependent upon the hoist being

in this position is provided, the compactor operation is continuous or for a predetermined number of cycles so the continual repeat of the compaction cycle occurs.

If the blade 36 has pivoted downwardly sufficiently, i.e. has moved sufficiently from the Figure 4 position towards the Figure 5 position, for the blade to clear the conventional "hold to run" zone the compactor will continue with its current cycle and then stop at the "parked" position shown in Figure 2.

The compactor may also be operated independently of the hoist controls by pressing button 45 which causes the compactor to perform a single compaction cycle. The button 45 must be pressed at least during the 'hold-to-run' part of the compaction cycle otherwise the compactor will stop. To perform a plurality of compaction cycles, button 45 must be released and pressed again to initiate each further cycle.

The compactor, in fact, may be provided in any desired way to carry out a cycle of operations which has essentially the same function. If desired, for example, one component such as the shield of the compactor may be slidably mounted instead of being carried by links.

Alternatively, if desired, a single blade and/or shield ram or more than two blades and/or shield rams may be provided.

Alternatively, if desired, instead of providing the shield 30 with a pair of upper and lower transversely spaced arms, the shield may be mounted by any desired arm assembly comprising one sufficiently rigid arm, a pair of arms as described or more than two arms.

The features disclosed in the foregoing description, or the following claims, or the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, as appropriate, may, separately or in any combination of such features, be utilised for realising the invention in diverse forms thereof

Claims

1. A refuse handling system of the kind specified wherein the control means comprises a manually operable control input device for the hoist which is adapted to operate the compactor to perform a compaction cycle.

2. A refuse handling system according to Claim 1 wherein said input device comprises means to enable the compactor to operate to perform a compaction cycle whilst the hoist is in motion and, when the hoist is stationary after being lowered to a predetermined lowered position, the compactor may be permitted to complete a current compaction cycle.

3. A refuse handling system according to Claim 1 or Claim 2 comprising means whereby the compactor is enabled to operate to perform a compaction cycle, provided that the hoist control input device is operated by an operator.

4. A refuse handling system according to Claim 1 or Claim 2 comprising means whereby, when the hoist is at or within a predetermined distance from an uppermost predetermined position, ie. a maximum raise zone, a signal to allow continued compactor operation to perform a compaction cycle is provided thereby allowing an operator to release the control device for the hoist so that whilst hoist motion is caused to cease a controller is signalled both for run mode and cycle initiation of the compactor whereby the compactor will perform a plurality of compaction cycles continuously until manual operation of the hoist control input device causes a hoist to be lowered out of the maximum raise zone whereupon control reverts to operator control.

5. A refuse handling system according to Claim 4 comprising means whereby when, during lifting or lowering of the hoist operator release of the control input device for the hoist occurs;

   i) the compactor is caused to stop performing a compaction cycle unless the hoist is within said maximum raise zone, whereupon continual repeat of a compaction cycle is provided, or
   ii) when the compactor has passed through a predetermined "pinch point" zone in which the compactor approaches a fully extended position in which it is closest to a wall of the charge hopper, the compactor is allowed to complete the current compaction cycle.

6. A refuse handling system according to Claim 5 comprising a means whereby upon reoperation of the hoist control input device by the operator, operation of the compactor in a compaction cycle is reinitiated.

7. A refuse handling system according to any one of the preceding Claims wherein the system has a joy stick type operator control input device and the hoist controls are such that when the hoist is at a minimum height, the compactor mechanism will complete a current compaction cycle and stop at a park position.

8. A refuse handling system according to any one of the preceding Claims wherein means are provided whereby the compactor is caused to perform a compaction cycle by operation of a compactor "hold to run" input separate from the hoist input.

9. A refuse handling system according to any one of the preceding Claims wherein the compactor com-

prises a shield pivotally connected to one end of an upper arm means and to one end of a lower arms means, the other ends of the arm means being pivotally connected relative to the charge hopper about spaced axes, and a blade pivotally connected to the shield at or adjacent a lower end of the shield, and drive means to move the shield and the blade about said pivotal connections in a compaction cycle.

10. A method of operating a refuse handling system of the kind specified comprising a system of manually operating a control input device for the hoist and which also causes operation of the compactor to perform a compaction cycle.

11. A method of operating a refuse handling system according to Claim 10 wherein the system of manually operating a control input device comprises operating the control input device to provide a "raise" input or a "down" input to raise or lower the hoist respectively, or to provide no input.

12. A method of operating a refuse handling system according to Claim 11 wherein the system of manually operating a control input device comprises operating the control input device to provide a "raise" input or a "down" input and causes the compactor to perform a compaction cycle.

13. A method of operating a refuse handling system according to Claim 11 or Claim 12 wherein the system of manually operating a control input device comprises operating the control input device to provide a "raise" input such that the hoist is raised to or within a predetermined distance from an uppermost predetermined position, ie. a maximum raise zone, wherein the compactor performs a plurality of compaction cycles continuously even when no input is provided.

14. A method of operating a refuse handling system according to Claim 12 or Claim 13 wherein the system of manually operating a control input device comprises operating the control input device to provide a "down" input when the hoist is at a minimum height to cause the compactor means to complete a current compaction cycle and stop at a park position.

15. A method of operating a refuse handling system according to any one of Claims 11 to 14 wherein the system of manually operating a control input device comprises operating the control input device to provide a "raise" input or a "down" input and then to provide no input;

i) to cause the compactor to stop performing a compaction cycle unless the hoist is at or within a predetermined distance from an uppermost predetermined distance from an uppermost predetermined position, whereupon continual repeat of a compaction cycle is provided, or

ii) when the compactor has passed through a predetermined "pinch point" zone in which the compactor approaches a fully extended position in which it is closest to a wall of the charge hopper, to allow the compactor to complete the current compaction cycle.

16. A method of operating a refuse handling system according to any one of Claims 11 to 15 wherein, where the control input device comprises a first button operable to provide a "raise" input, a second button operable to provide a "down" input and where operating neither button provides no input.

17. A method of operating a refuse handling system according to any one of Claims 11 to 16 wherein, where the control input device comprises a joystick biased to a spring load to neutral position wherein no input is provided, the joystick being moveable in a lifting direction to provide a "raise" input and in a lowering direction to provide a "down" input

18. A method of operating a refuse handling system according to any one of Claims 11 to 17 wherein the refuse handling system is as specified in any one of Claims 2 to 10.

19. A method of operating a refuse handling system according to any one of Claims 11 to 18 comprising the step of causing the compactor to perform a compaction cycle by operation of a compactor "hold to run" input separate from the hoist input.

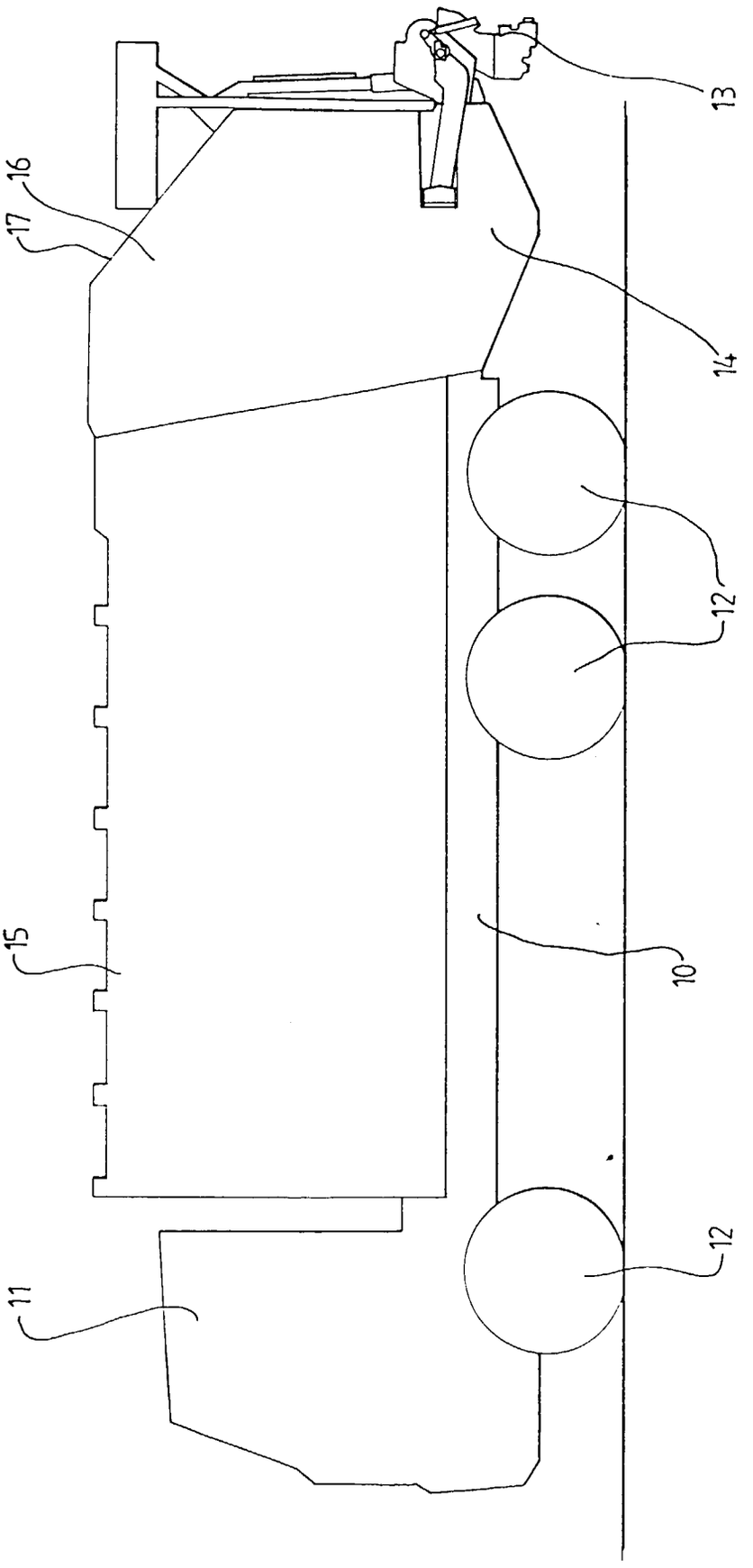

FIG 1

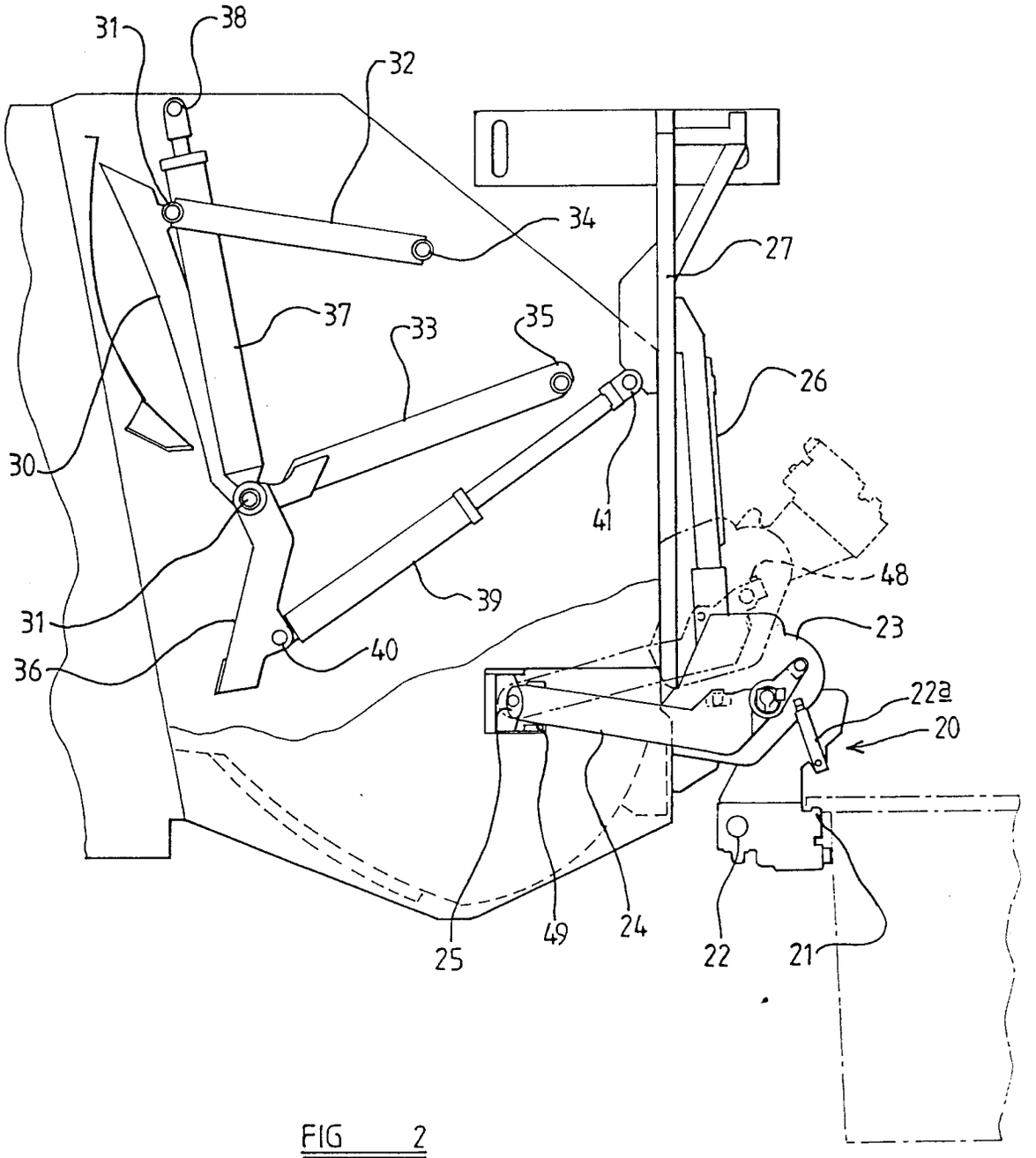

FIG 2

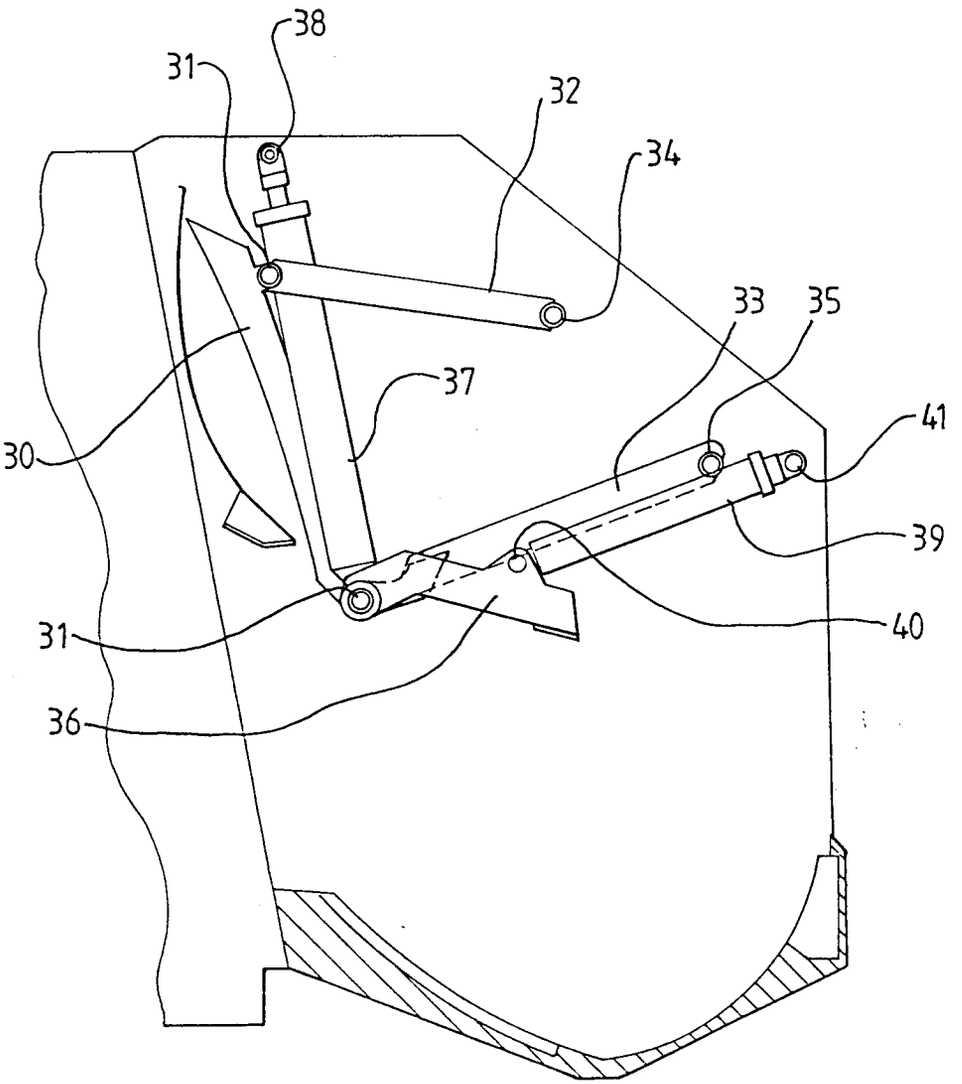

FIG 3

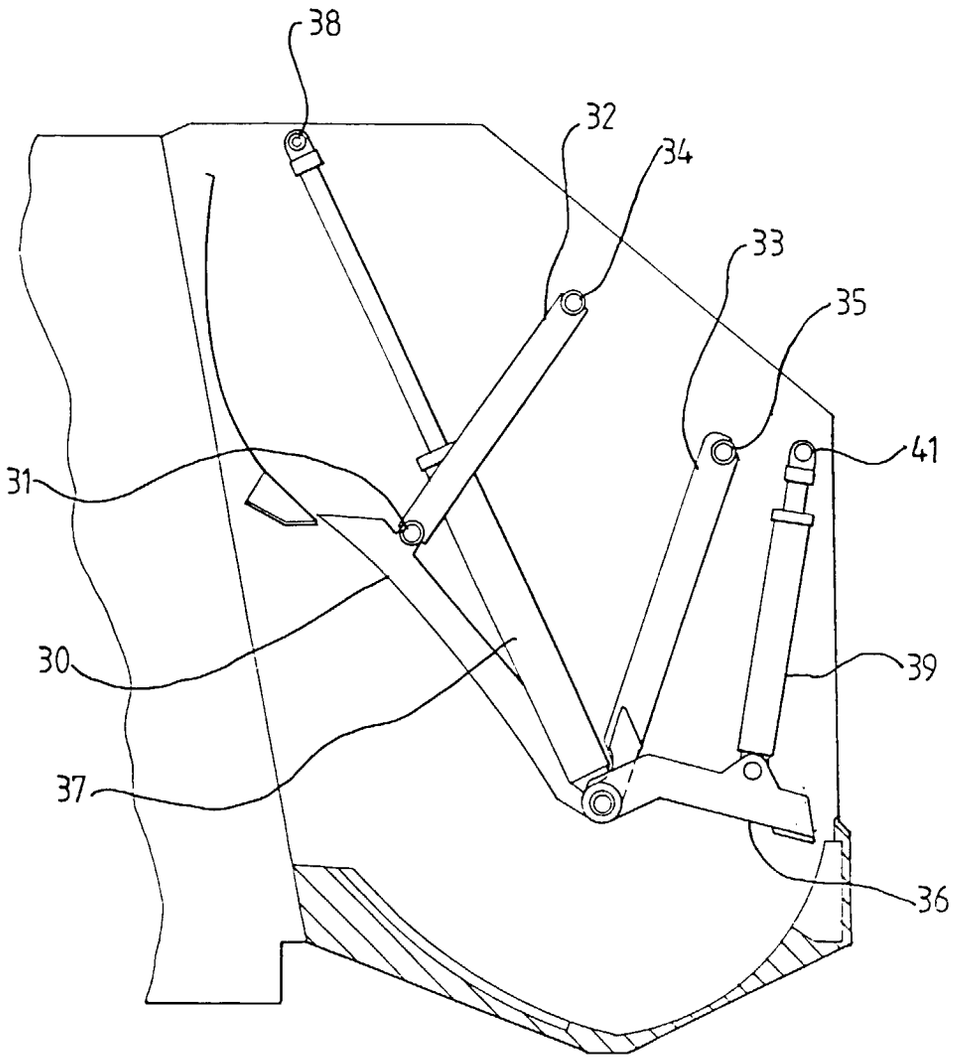

FIG 4

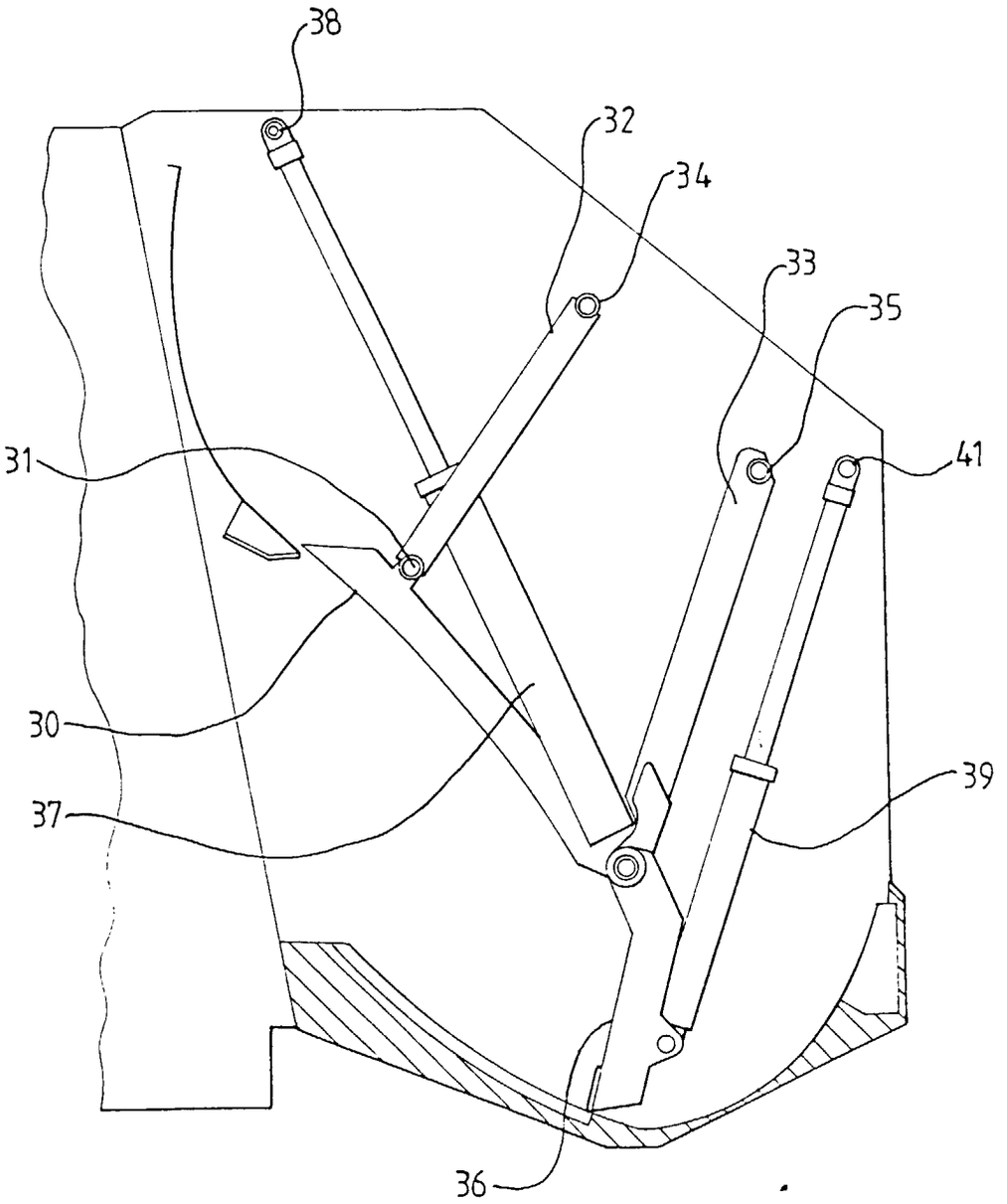

FIG 5

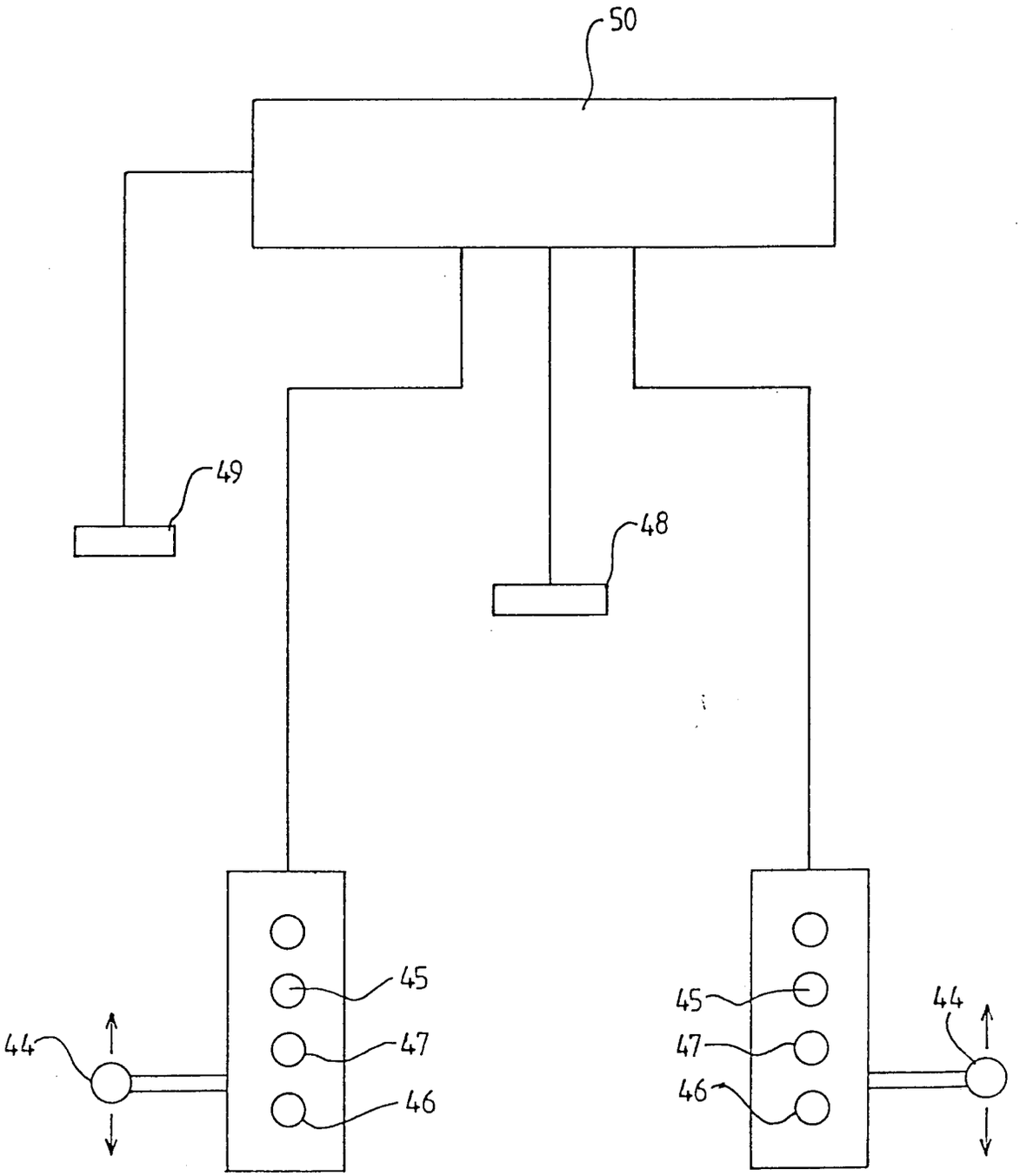

FIG 6

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 97 30 8250

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)
X A	GB 1 299 562 A (J. REY) 13 December 1972 * page 4, line 130 - page 5, line 67 * * figure 7 *	1,3,7, 10-12,18 17	B65F3/20 B65F3/04
X	EP 0 089 521 A (FAHRZEUGBAU HALLER GMBH) 28 September 1983 * page 9, line 22 - page 12, line 14 * * figure *	1,3,10	
X	WO 84 01558 A (KUKA UMWELTTECHNIK GMBH) 26 April 1984 * page 8, line 11 - page 10, line 6 * * figures 1,2 *	1,3,10	
X	GB 1 313 834 A (SHEFFLEX LTD) 18 April 1973 * page 2, line 91 - line 104 *	1,3,10	
X	US 5 344 273 A (D. RADLEIN) 6 September 1994 * column 3, line 59 - column 4, line 15 * * figure 10 *	1,3,10	TECHNICAL FIELDS SEARCHED (Int.Cl.6) B65F
A	GB 2 167 036 A (PEABODY INTERNATIONAL) 21 May 1986 * page 3, line 29 - line 73 * * figure 1 *	1,9	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	28 May 1998	Smolders, R

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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