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(54) **Auxiliary means for tilting a cabin of a truck**

(57) Auxiliary means (1) for tilting the cabin of a lorry (2), whereby the tilting mechanism of the cabin of a lorry (2) is driven by a to and fro rotating motion of a driving shaft (4) designed to be manually operated, whereby the auxiliary means (1) mainly consists of a separate driving device (1) provided with a coupling piece (6) to couple the auxiliary means (1) to the driving shaft (4) of the tilting mechanism, whereby the coupling piece (6) is arranged such that it can be rotated to and fro in a housing (5) and whereby driving means (9) are provided to rotate the coupling piece (6) to and fro.

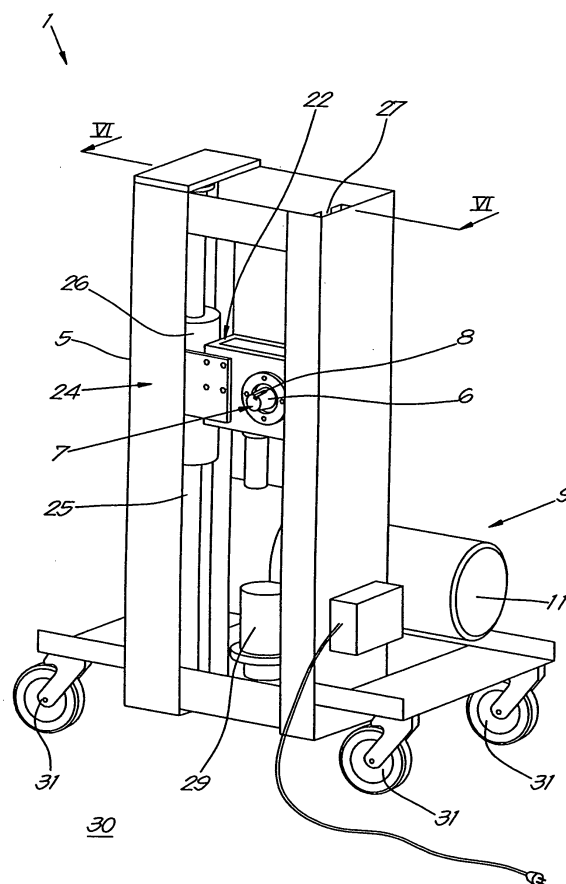


Fig. 1

Description

[0001] The present invention concerns an auxiliary means for tilting the cabin of a lorry.

[0002] In particular, the invention concerns such an auxiliary means for tilting cabins of lorries provided with a tilting mechanism which can be driven by the reciprocating motion of a driving shaft which is to be manually operated.

[0003] Most lorries have such a driving shaft which is usually accessible via the outside of the lorry and whereby the driving shaft must be normally rotated to and fro.

[0004] According to the present state of the art, auxiliary means are known for tilting cabins of lorries by means of a to-and-fro rotating motion of such a driving shaft.

[0005] Said known auxiliary means consist for example of a rod, a handle, a crank or the like, which is provided on the driving shaft, whereby the auxiliary means is typically provided with a hexagon or the like, which can be provided in a fitting manner in a corresponding socket hole in the driving shaft or vice versa.

[0006] The rod, handle, crank or the like hereby forms, after having been coupled to the driving shaft, a lever arm which must be manually moved to and fro in order to activate the tilting mechanism.

[0007] Naturally, the larger the lever arm, the less force is required for the to and fro motion.

[0008] An obvious disadvantage of such known auxiliary means remains, however, that a lot of human strength is still required to operate the tilting mechanism.

[0009] Other auxiliary means for tilting the cabins of lorries are also known whereby no manual labour or human muscular strength is required.

[0010] Such known auxiliary means are usually driving devices which have been integrated in the cabin of the lorry, which driving devices can be operated from the cabin itself.

[0011] A disadvantage of such known, non-manual auxiliary means is that they are relatively expensive as such, and that moreover such a driving device must be individually provided in each lorry, which increases the costs even further.

[0012] The present invention aims to remedy one or several of the above-mentioned and other disadvantages.

[0013] To this end, the present invention concerns an auxiliary means for tilting the cabin of a lorry, whereby the tilting mechanism of the cabin of a lorry is driven by the to and fro rotating motion of a driving shaft which is to be manually operated, whereby the auxiliary means is mainly formed of a separate driving device which is provided with a coupling piece for coupling the auxiliary means to the driving shaft of the tilting mechanism, whereby the coupling is arranged such that it can be rotated to and fro in a housing and whereby driving means are provided to rotate the coupling piece to and fro.

[0014] A major advantage of such an auxiliary means for tilting the cabin of a lorry according to the invention

is that it must not be driven manually, at least not by human muscle power.

[0015] Another advantage is that such an auxiliary means can be applied to several lorries, of any type whatsoever, as long as the lorry is provided with an above-mentioned driving shaft to activate the tilting mechanism, which is usually the case.

[0016] According to a preferred embodiment of an auxiliary means according to the invention, the driving means are at least partly hydraulically excited, but the driving means can just as well be excited partly pneumatically or at least partly electrically.

[0017] According to another preferred embodiment of an auxiliary means for tilting the cabin of a lorry in correspondence with the present invention, a slip coupling is provided between the coupling piece and the driving means.

[0018] An advantage of such an embodiment of an auxiliary means according to the invention is that, thanks to the presence of the slip coupling, one can avoid that a too large reciprocating motion of the driving means would result in a too large to and fro rotating motion of the coupling piece, which in turn would lead to mechanical stress in or damage to the driving shaft, the tilting mechanism or the coupling piece itself.

[0019] For, when a certain force between the driving means and the coupling piece is exceeded, for example, when the coupling piece has put the driving shaft in an utmost position, whereas the driving means are still trying to drive the coupling piece further in the same direction, the slip coupling will make sure that the driving means can move further without any further motion of the coupling piece.

[0020] An additional advantage of such an embodiment of an auxiliary means according to the invention is that it can be applied to different types of lorries without the user having to adjust all sorts of parameters.

[0021] With one type of lorry, for example, the driving shaft will have to be rotated to and fro some 60°, whereas for another lorry this angular rotation may amount for example to 90°.

[0022] By providing the auxiliary means according to the invention with driving means in this case which can make the coupling piece rotate to and fro over at least an angle of 90°, the driving shaft of both above-mentioned types of lorries can be driven without any problem thanks to the presence of the slip coupling in such auxiliary means.

[0023] For, at a certain angular rotation of the coupling piece, in particular an angular rotation of 60° for the first case and of 90° for the second case respectively, the driving shaft will be blocked, as a result of which the slip coupling will slip.

[0024] The driving means can nevertheless continue to work then until the coupling piece is driven in the opposite direction without any damage being caused to the driving shaft, the tilting mechanism or the coupling piece.

[0025] Naturally, the angular rotations of 60° and 90°

as mentioned above are merely given as an example, and an auxiliary means can be applied with reciprocating motions of other magnitudes while still remaining within the scope of the invention.

[0026] According to another preferred embodiment of an auxiliary means according to the invention, the driving means are mainly formed of a system with a pump, such as for example a hydraulic pump which can make at least a piston with a connecting rod move to and fro in a cylinder, whereby the connecting rod is connected to the coupling piece, such that a rectilinear motion of the piston in the cylinder is transformed in a rotating motion of the coupling piece.

[0027] Such an embodiment is particularly practical, since hydraulic systems are widely available and large forces can be easily developed with the latter.

[0028] According to yet another preferred embodiment of an auxiliary means for tilting the cabin of a lorry, the rotatable coupling piece is part of a part of the housing which is arranged such that it can move in relation to the rest of the housing.

[0029] The auxiliary means are hereby preferably also provided with positioning means so as to be able to position the moving part of the housing, together with the coupling piece, in relation to the rest of the housing.

[0030] The positioning means can for example be driven by the same hydraulic pump 10 as mentioned above.

[0031] In another embodiment, said positioning means can also be driven manually for example.

[0032] An advantage of all the last-mentioned embodiments of an auxiliary means according to the invention is that the moving part of the housing, which contains the coupling piece, can be easily placed in another position in relation to the rest of the housing, into a position whereby the coupling piece is aligned with the driving shaft of the tilting mechanism on the lorry.

[0033] In this manner, the auxiliary means does not have to be positioned as a whole in relation to the driving shaft, but only the moving part of the housing with the coupling piece, whereas the rest of the housing can for example be simply placed on the ground next to the lorry.

[0034] As a result, such an embodiment of an auxiliary means according to the invention can also be easily applied to different types of lorries with varying positions for the driving shaft of the tilting mechanism, and in particular with lorries with varying heights for the driving shaft in relation to the ground.

[0035] According to an even more preferred embodiment of an auxiliary means according to the invention, the auxiliary means mainly consists of a separate rolling driving device.

[0036] Such an embodiment makes sure that the auxiliary means can be easily moved over the ground, for example in a garage or the like, between several lorries.

[0037] In order to better explain the characteristics of the invention, the following preferred embodiments of an auxiliary tool for tilting the cabin of a lorry according to the invention is described with reference to the accom-

panying drawings, in which:

figures 1 and 2 schematically show an auxiliary means according to the invention, seen in perspective as of a front view, whereby it can be coupled to a lorry, and as of the opposite rear side respectively; figure 3 schematically shows the moving part of the housing in perspective, whereby some parts have been omitted, which is indicated by F3 in figure 1; figure 4 is a side elevation, according to arrow F4 in figure 3, given as an illustration, of an exploded version with the main components that are necessary for mounting the coupling piece in the moving part of the housing;

figure 5 schematically illustrates the use of an auxiliary means in accordance with the invention, seen in perspective; and,

figure 6 is a view according to a section VI-VI indicated in figure 1, but for an alternative embodiment of an auxiliary means according to the invention.

[0038] The auxiliary means 1 according to the invention, represented in figures 1 and 2, is designed for tilting the cabin 2 of a lorry 3, a sample of which is represented in figure 5 by way of illustration.

[0039] It is necessary to tilt open the cabin of a lorry 2 in order to have access to the motor parts or the transmission or the like, situated under the cabin 2, whereas by means of the reverse motion, the cabin 2 is put back into a ready-for-use position of the lorry 3.

[0040] An auxiliary means 1 according to the invention aims to simplify the tilting of the cabin 2 of a lorry 3 with lorries 3 that are provided with a tilting mechanism (not represented in the figures), which is driven by a reciprocating motion of a manually operated driving shaft 4.

[0041] Most lorries 3 are provided with such a tilting mechanism with a manually operated driving shaft 4, whereby the driving shaft 4 is usually accessible from the outside of the lorry 3.

[0042] It is customary to hereby provide a crank or the like on the driving shaft 4 of the tilting mechanism which is to be manually moved to and fro by a person, so as to obtain an alternating rotation of the driving shaft 4, which alternating rotation in turn drives the tilting mechanism, resulting in the cabin 2 being tilted.

[0043] Such a manual operation of the tilting mechanism is very laborious.

[0044] An auxiliary means 1 according to the invention remedies this problem, however.

[0045] To this end, the auxiliary means 1 according to the invention, shown in figures 1 and 2, mainly consists of a separate driving device 1 with a housing 5 in which a coupling piece 6 has been provided in a rotating manner.

[0046] The coupling piece 6 is in this case formed of a shaft 6 which partly protrudes from the housing 5 with one far end 7, which far end 7 is moreover provided with a certain profiling 8, in this case formed of a slot 8, so as

to be able to easily couple the coupling piece 6 to the driving shaft 4 of the tilting mechanism of the lorry 3.

[0047] Naturally, the profiling 8 may assume all other sorts of shapes, corresponding to the shape of the driving shaft 4 on the lorry 3.

[0048] Further, the driving device 1 is provided with driving means 9, with which the coupling piece 6 can be rotated to and fro in relation to the housing 5.

[0049] According to the invention, these driving means 9 do not use any human muscle power, apart from a few control buttons or the like which may have to be pushed in.

[0050] Indeed, the driving means 9 according to the invention are preferably formed of a hydraulic or pneumatic system 9 with for example a hydraulic pump or a compressor 10 which is driven by an electric motor.

[0051] The aim hereby is to pump a fluid, for example hydraulic oil, into an oil reservoir 11 or for example ambient air via pipes 12 from and to the chambers 13 that are formed in at least one cylinder 14 between a piston 15, provided in said cylinder 14 in such a manner that it can move to and fro, and the cylinder wall 16.

In the example of figures 1 to 3 included, the hydraulic pump 10 or compressor drives a pair of pistons 15, each moving in their own cylinder 14.

[0052] The pistons 15 are hereby each provided with their own connecting rod 17, which is connected to the coupling piece 6, such that a rectilinear motion of the pistons 15 in the cylinders 14 is transformed in a rotating motion of the coupling piece 6.

[0053] To this end, the respective far ends of the connecting rods 17 are in this case provided on a disc or a flange 18 with a central opening through which the shaft 6, forming the coupling piece, is provided.

[0054] In particular, the far ends of the connecting rods 17 are hinge-mounted to the flange 18 in positions 19 and 20 which are diametrically opposed in relation to the central axis CC of the coupling piece 6.

In many workshops, compressed air is available via an external compressed air line.

[0055] In an embodiment whereby the driving means 9 are of a pneumatic nature, it is therefore possible to connect such an external compressed air line directly to the pipes 12 of the cylinders 14.

[0056] In this way is obtained a very light construction, whereby no separate compressor is required for the auxiliary means 1, nor a separate motor for the drive of the compressor, making it moreover possible to strongly reduce the cost price of such an auxiliary means 1 according to this embodiment.

[0057] Further, it is not excluded to work for example with a system which is entirely electrically driven or the like.

[0058] Of course, the aim is that the drive of the flange 18 with the driving means 9 results in a to and fro rotating motion of the shaft 6.

[0059] In the given example, a connection between the flange 18 and the shaft 6 is provided to this end, whereby

a safety device in the shape of a slip coupling 21 is applied however.

[0060] This slip coupling 21 makes sure that a torque applied on the flange 18 is transmitted to the shaft 6, as long as said torque does not exceed a certain maximum value.

[0061] If this maximum value of the transmittable torque is exceeded, the slip coupling will start to slip and the actual connection between the flange 18 and the shaft 6 will be interrupted, such that any further forces being exerted on the flange by means of the driving means 9 will have no or hardly any influence whatsoever on the shaft 6.

[0062] As is known, the pistons 15 in the cylinders 14, under the influence of the oil pressure coming from the oil pump 10, or alternatively from the air pressure coming from a compressor or an external compressed air line, can be moved to and fro between two extreme positions.

[0063] In said extreme positions, the motion can be reversed, for example by controlling valves or the like in the pipes 12, such that the outlet of the oil pump 10 or the compressor or the external compressed air line is connected to the other chamber of the chambers 13 than the one that was connected to said outlet before the valves were being operated, resulting in the direction of flow of the fluid, for example the oil or the air, in the pipes 12 being reversed.

[0064] Another method may consist in alternately putting the pistons 15 in the cylinders 14 in contact with the oil pressure of the oil pump 10 or the air pressure of the compressor or the external compressed air line, whereby the piston 15, which is not exposed to said oil pressure or air pressure, follows the motion without transmitting any energy to the flange 18.

[0065] The control of the valves may be activated by the detection of a situation whereby the connecting rods 17 have taken up a specific end position.

[0066] Electronic detection means may be used to this end, or use can be simply made of limit switches or the like.

[0067] It is clear that a reciprocating motion of the pistons 15 according to a straight line in the cylinders 14, between said two extreme positions, results in a rotational motion, whereby the aim in this case, as opposed to what is the case for example with the known crank/connecting rod mechanisms of combustion engines, is to make the shaft 6 rotate between two extreme angular positions.

[0068] The angle of rotation between the above-mentioned angular positions is preferably smaller than 360° and even better still smaller than 180°.

[0069] Moreover, it is not excluded according to the invention to manufacture the auxiliary means such that the above-mentioned angle of rotation is adjustable.

[0070] For example, with the known techniques it is easy to make sure that the reciprocating motion of the pistons 15 is restricted or enlarged as a function of the desired angle of rotation of the coupling piece 6 to be

obtained.

[0071] Further, the rotating arrangement of the coupling piece 6 is preferably part of a part 22 of the housing 5 which is erected such that it can move in relation to the rest of the housing 23.

[0072] Naturally, the cylinders 14, in particular the cylinder walls 16 of the cylinders 14, are fixed to said moving part of the housing 22, such that the required forces can be developed in relation to the flange 18.

[0073] In the embodiment of figure 1, the moveable arrangement of the part 22 is obtained by means of a spindle 24.

[0074] This spindle 24 is formed of a screw spindle 25 arranged in a rotating manner in the part 23 of the housing and of a part 26 in the form of a nut, provided over said screw spindle 25 in a non-rotating manner and which is part of the moving part 22 of the housing 5.

[0075] As is known, a rotating motion of the screw spindle 25 can hereby be transformed in a linear motion of the part 26 and thus of the moving part of the housing 22 in relation to the rest of the housing 23.

[0076] In order to obtain a good guiding for the moving part of the housing 22 in the rest of the housing 23, a guiding rail 27 is in this case provided in the housing 23 on the side of the moving part 22 opposite the side with the spindle 24, in which a roller 28, erected in a rotating manner on the moving part of the housing 22, can be moved to and fro.

[0077] It is clear that this arrangement is designed to be able to position the coupling piece 6 in the housing 5, and in particular to be able to adjust the height of the coupling piece 6 in relation to the rest of the housing 23.

[0078] In this manner, the coupling piece 6 can be easily aligned with the driving shaft 4 of the tilting mechanism of the lorry 3, irrespective of the initial difference in height between both, at least within certain limits.

[0079] Naturally, it is not excluded according to the invention to provide the auxiliary means 1 with other forms of positioning means than those discussed here in order to be able to position the moving part of the housing 22 with the coupling piece 6 in relation to the rest of the housing 23.

[0080] In the embodiment shown, the positioning means are driven for example by separate driving means 29, but alternatively it is not excluded to drive the positioning means with the above-mentioned hydraulic pump 10 or compressor and motor which excite the driving means 9.

[0081] In the given example, the auxiliary means 1 is also a separate mobile driving device.

[0082] To this end, the housing 5 rests on a base 30 by means of wheels 31.

[0083] Such an embodiment makes it possible to move the auxiliary means 1 over the base 30 without too much effort, which is particularly practical when using the auxiliary means 1 for example in a garage where many cabins 2 of lorries 3 have to be often tilted for maintenance or repairs to the lorries 3.

[0084] As already described above, the far end 7 of the shaft 6 can have many shapes corresponding to the shape of the driving shaft 4 of the tilting mechanism of the lorry 3 to which the coupling piece 6 must be coupled.

[0085] However, according to the invention it is also possible to provide a series of connecting pieces which can be provided on the coupling piece 6 in order to be able to connect the auxiliary means 1 to the driving shafts 4 of different types of tilting mechanisms of cabins of lorries 2.

[0086] The use of an auxiliary means 1 according to the invention is simple and as follows:

[0087] In order to tilt the cabin 2 of a lorry 3, the auxiliary means 1 is driven near the lorry 3, after which the moving part 22 of the housing 5 containing the coupling piece 6 can be put at the same height as the driving shaft 4 of the tilting mechanism with the positioning means 24.

[0088] In this position, the coupling piece 6 can be easily connected to the driving shaft 4, either directly or indirectly by means of the above-mentioned connecting piece.

[0089] By activating the driving means 9, following the connection, a reciprocating motion of pistons 15 will be transformed in a to and fro rotating motion of the coupling piece 6 and thus of the driving shaft 4, 5, as a result of which the tilting mechanism is driven and the cabin 2 is tilted.

[0090] If the movement of the to and fro rotating flange 18 is too large, for example in the case where the tilting mechanism of the lorry 3 requires only a more limited rotation of the driving shaft 4 than the angular rotation which is realised by the driving means 9, then the slip coupling 21 will make sure that said too large movement is not continued up to the coupling piece 6, thus avoiding damage or too large tensions in the driving shaft 4.

[0091] In this manner, the cabin 2 of a lorry 3 can be very quickly tilted and without any large human efforts.

[0092] Many other embodiments of an auxiliary means 1 according to the invention are not excluded either.

[0093] An alternative is shown for example in figure 6, whereby the positioning means 24 are somewhat different.

[0094] The moving part 22 of the housing 5, with which the height of the coupling piece 6 is adjusted, is hereby provided with a hollow bush 32, such that it can shift up and down over a smooth shaft 33 instead of via a spindle 24 over a screw spindle 25.

[0095] Further, said moving part 22 is fixed to a chain 34, whereby this chain 34 is provided over two chain wheels 35 and 36 which are mounted in a rotating manner in an adjacent side wall 37 of the housing 5 at a certain distance from one another, in particular at the height of the far ends of the shaft 33.

[0096] To this end, each chain wheel 35 and 36 is mounted on a shaft, an upper shaft 38 and a lower shaft 39 respectively, which shafts 38 and 39 are further bearing-mounted in the above-mentioned side wall 37.

[0097] The upper shaft 38 hereby protrudes through

the side wall 37 outside the housing 5 and it is provided with a driving wheel 40 on said protruding part of the shaft 38 which is designed to be manually driven by means of a crank 41.

[0098] It is clear that the moving part 22 can be very quickly adjusted in height by simply turning the driving wheel 40, since the chain 34 can be moved over a considerable distance by just turning the driving wheel 40 a little, thus taking along the moving part 22.

[0099] Preferably, locking means are also provided so as to be able to lock the chain wheels 35 and 36 and the chain 34, and consequently also the moving part 22, in a certain position.

[0100] These locking means may for example consist of a brake or a toothed wheel with a pawl or the like, but many other variations are not excluded either according to the invention.

[0101] The invention is by no means restricted to the embodiments of an auxiliary means 1 for tilting the cabin of a lorry 2 described by way of example and represented in the accompanying drawings; on the contrary, such auxiliary means 1 can be made in many different ways or be used in other applications while still remaining within the scope of the invention.

Claims

1. Auxiliary means (1) for tilting the cabin of a lorry (2), whereby the tilting mechanism of the cabin of a lorry (2) is driven by a to and fro rotating motion of a driving shaft (4) which is to be manually operated, **characterised in that** the auxiliary means (1) mainly consists of a separate driving device (1) provided with a coupling piece (6) to couple the auxiliary means (1) to the driving shaft (4) of the tilting mechanism, whereby the coupling piece (6) is arranged such that it can be rotated to and fro in a housing (5) and whereby driving means (9) are provided to rotate the coupling piece (6) to and fro.
2. Auxiliary means (1) according to claim 1, **characterised in that** the driving means are at least partly hydraulically excited.
3. Auxiliary means (1) according to claim 1 or 2, **characterised in that** the driving means are at least partly pneumatically excited.
4. Auxiliary means (1) according to any one of claims 1 to 3, **characterised in that** the driving means are at least partly electrically excited.
5. Auxiliary means (1) according to any one of the preceding claims, **characterised in that** between the coupling piece (6) and the driving means (9) is provided a slip coupling (21).
6. Auxiliary means (1) according to any one of the preceding claims, **characterised in that** the driving means (9) comprise at least one piston (15) with a connecting rod (17) which can move to and fro in a cylinder (14) and whereby a rectilinear motion of the piston (15) in the cylinder (14) is transformed into a rotating motion of the coupling piece (6).
7. Auxiliary means (1) according to claim 6, **characterised in that** the connecting rod (17) is connected to the coupling piece (6).
8. Auxiliary means (1) according to claim 6 or 7, **characterised in that** the driving means (9) are mainly formed of a system with a hydraulic pump or compressor (10) which can make the above-mentioned at least one piston (15) with connecting rod (17) move to and fro in a cylinder (14).
9. Auxiliary means (1) according to claim 6 or 7, **characterised in that** the driving means (9) are mainly formed of an external compressed air line which is directly connected to the cylinder (14) via pipes (12).
10. Auxiliary means (1) according to any one of claims 6 to 9, **characterised in that** the driving means (9) control a pair of pistons (15) with connecting rod (17), each moving in their own cylinder (14), whereby the respective connecting rods (17) are directly or indirectly connected to the coupling piece (6) in positions (19,20) which are diametrically opposed to one another in relation to the central shaft (CC) of the coupling piece (6).
11. Auxiliary means (1) according to any one of claims 6 to 10, **characterised in that** the driving means (9) can make the piston or pistons (15) move to and fro in the cylinder or cylinders (14) between two extreme positions corresponding to two extreme angular positions of the coupling piece (6).
12. Auxiliary means (1) according to claim 11, **characterised in that** the reversal of the motion of the pistons (15) in the cylinders (14), when the extreme positions are reached, is controlled by at least one limit switch.
13. Auxiliary means (1) according to claim 11 or 12, **characterised in that** an angle of rotation between the two extreme angular positions of the coupling piece amounts to less than 360°.
14. Auxiliary means (1) according to any one of claims 11 to 13, **characterised in that** the angle of rotation between the two extreme angular positions of the coupling piece (6) is adjustable.
15. Auxiliary means (1) according to any one of the pre-

ceding claims, **characterised in that** the rotatable coupling piece (6) is part of a part of the housing (22) which is arranged such that it can move in relation to the rest of the housing (23).

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16. Auxiliary means (1) according to claim 15, **characterised in that** the auxiliary means (6) is provided with positioning means (24) making it possible to position the moving part of the housing (22) with the coupling piece (6) in relation to the rest of the housing (23). 10
17. Auxiliary means (1) according to claims 8 and 16, **characterised in that** the positioning means (24) are driven by the same hydraulic pump or compressor (10) as mentioned above. 15
18. Auxiliary means (1) according to claim 16, **characterised in that** the positioning means (24) are driven by separate driving means (29). 20
19. Auxiliary means (1) according to claims 16 and 18, **characterised in that** the positioning means (24) consist of a chain (34) which is provided over two chain wheels (35, 36), whereby the moving part (22) is mounted on the chain (34) and whereby at least one of the chain wheels (35,36) is driven via a driving wheel to be manually driven (40). 25
20. Auxiliary means (1) according to any one of the preceding claims, **characterised in that** the auxiliary means (1) is mainly formed of a separate mobile driving device (1). 30
21. Auxiliary means (1) according to any one of the preceding claims, **characterised in that** the auxiliary means (1) is provided with several connecting pieces which can be provided on the coupling piece (6) so as to be able to connect the auxiliary means (1) on the driving shafts (4) of different types of tilting mechanisms of cabins of lorries (2). 35 40

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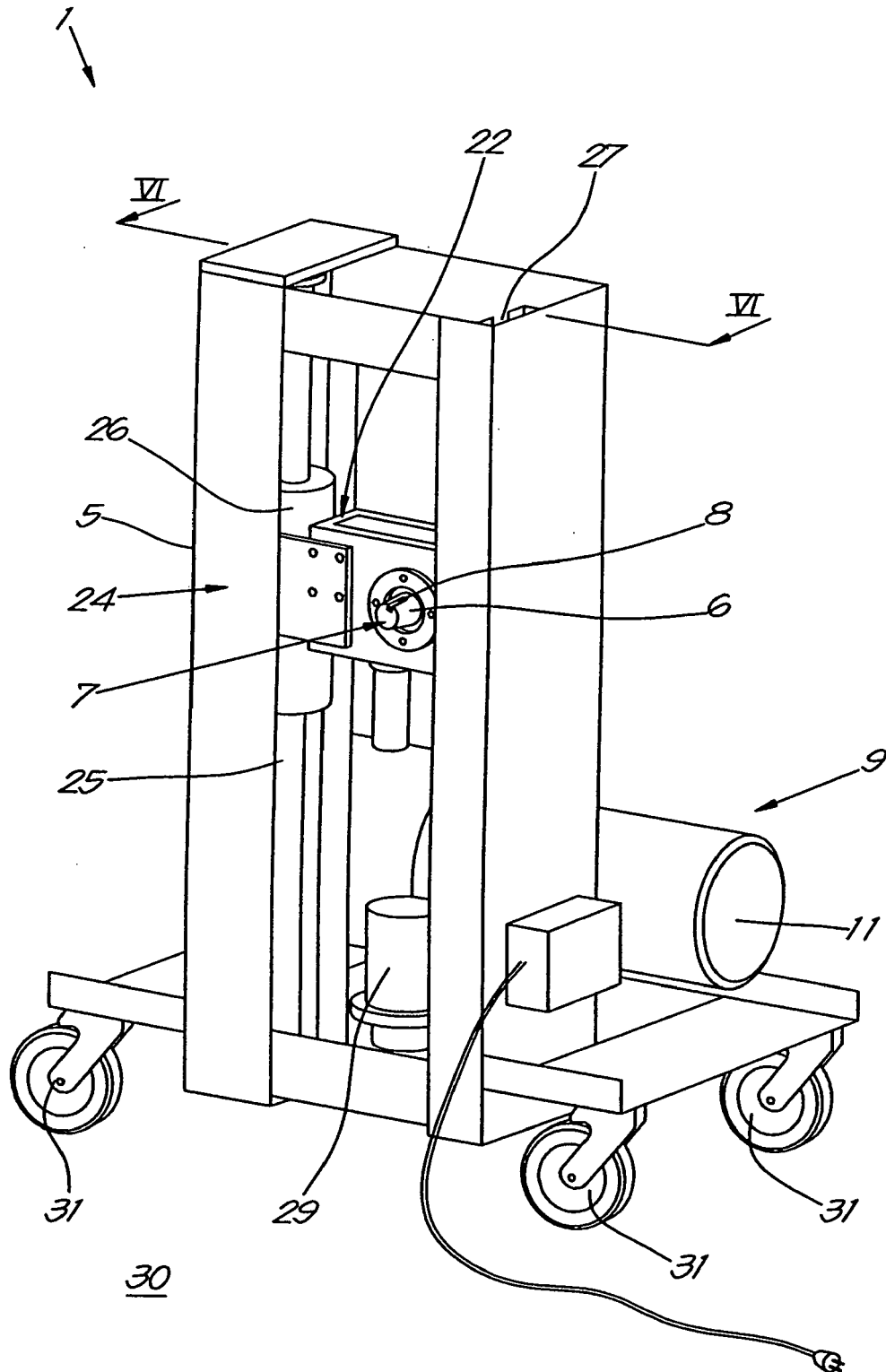


Fig. 1

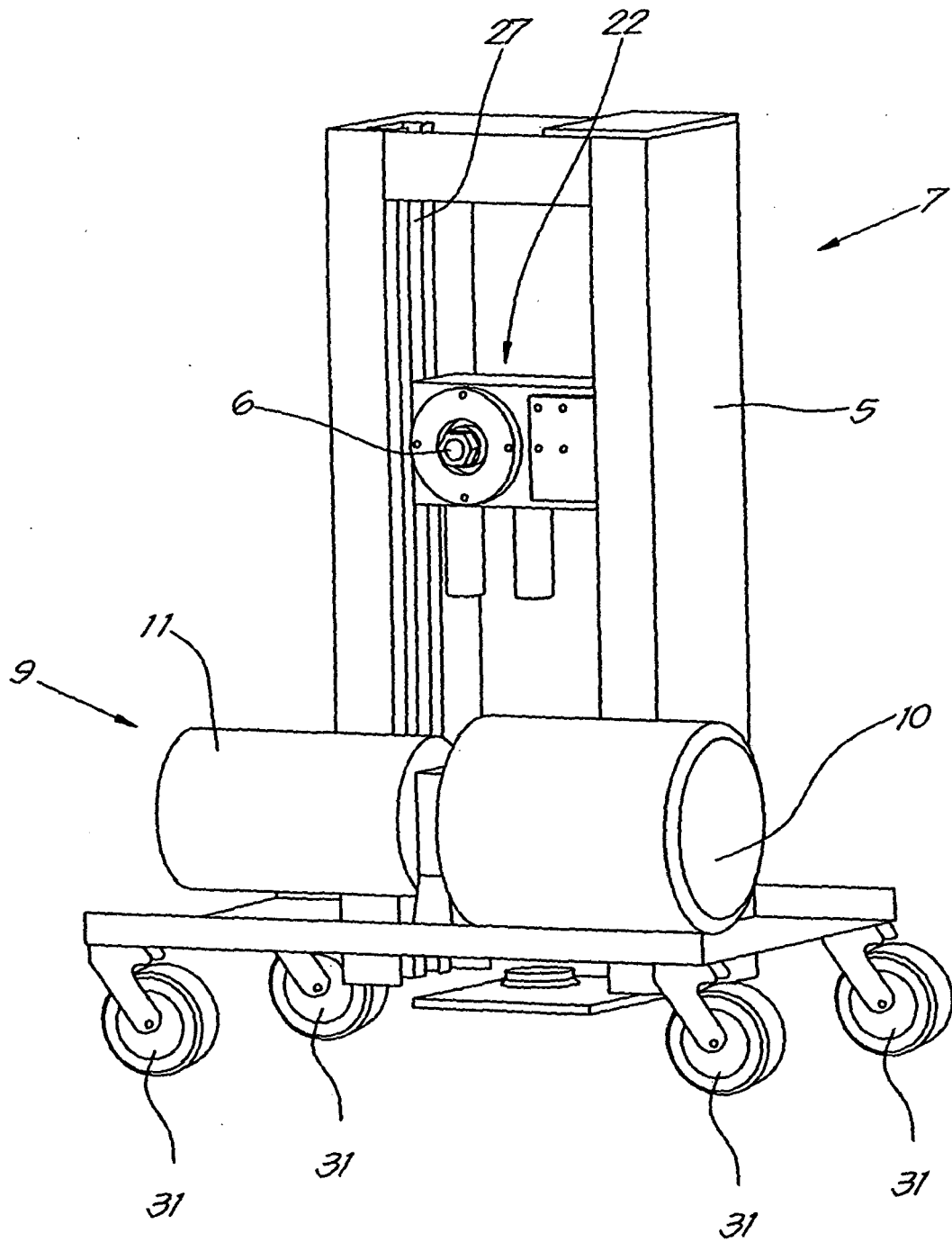


Fig. 2

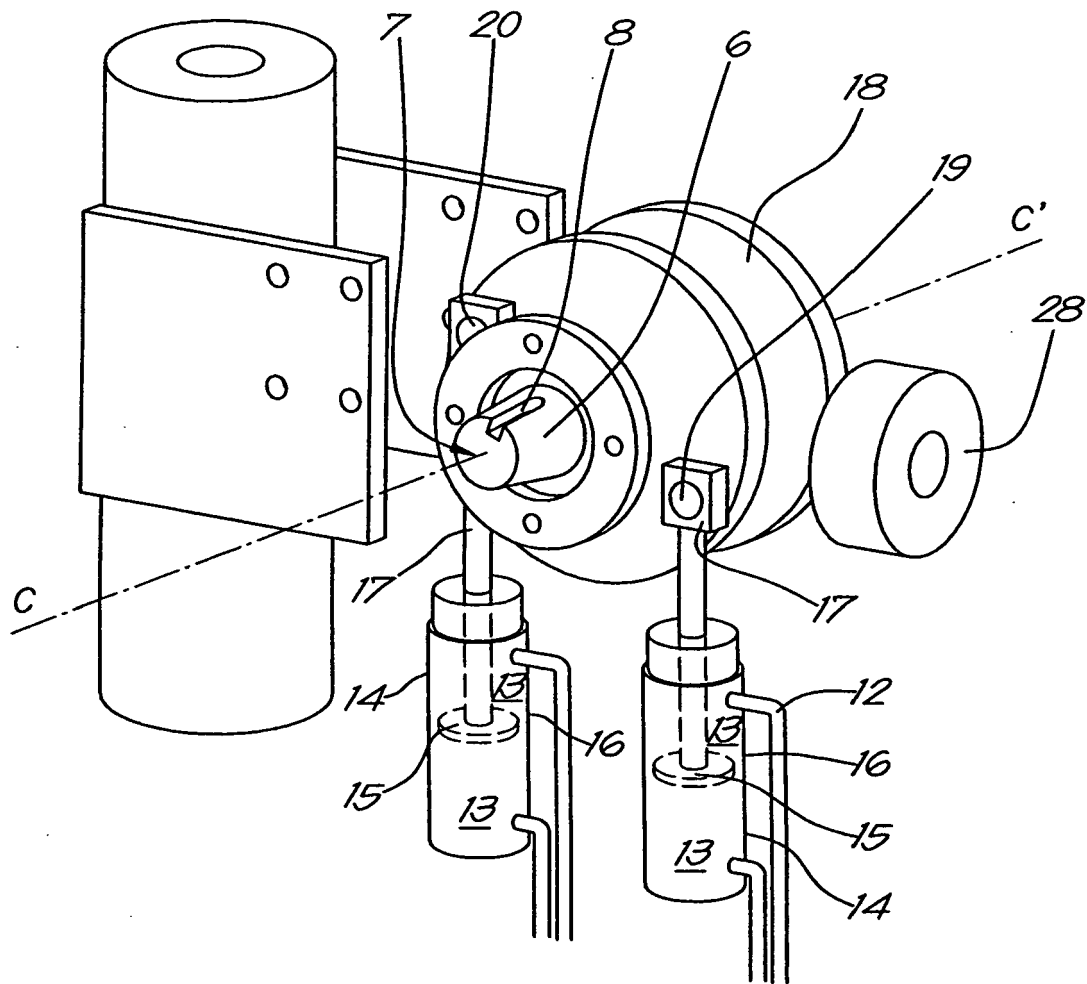


Fig.3

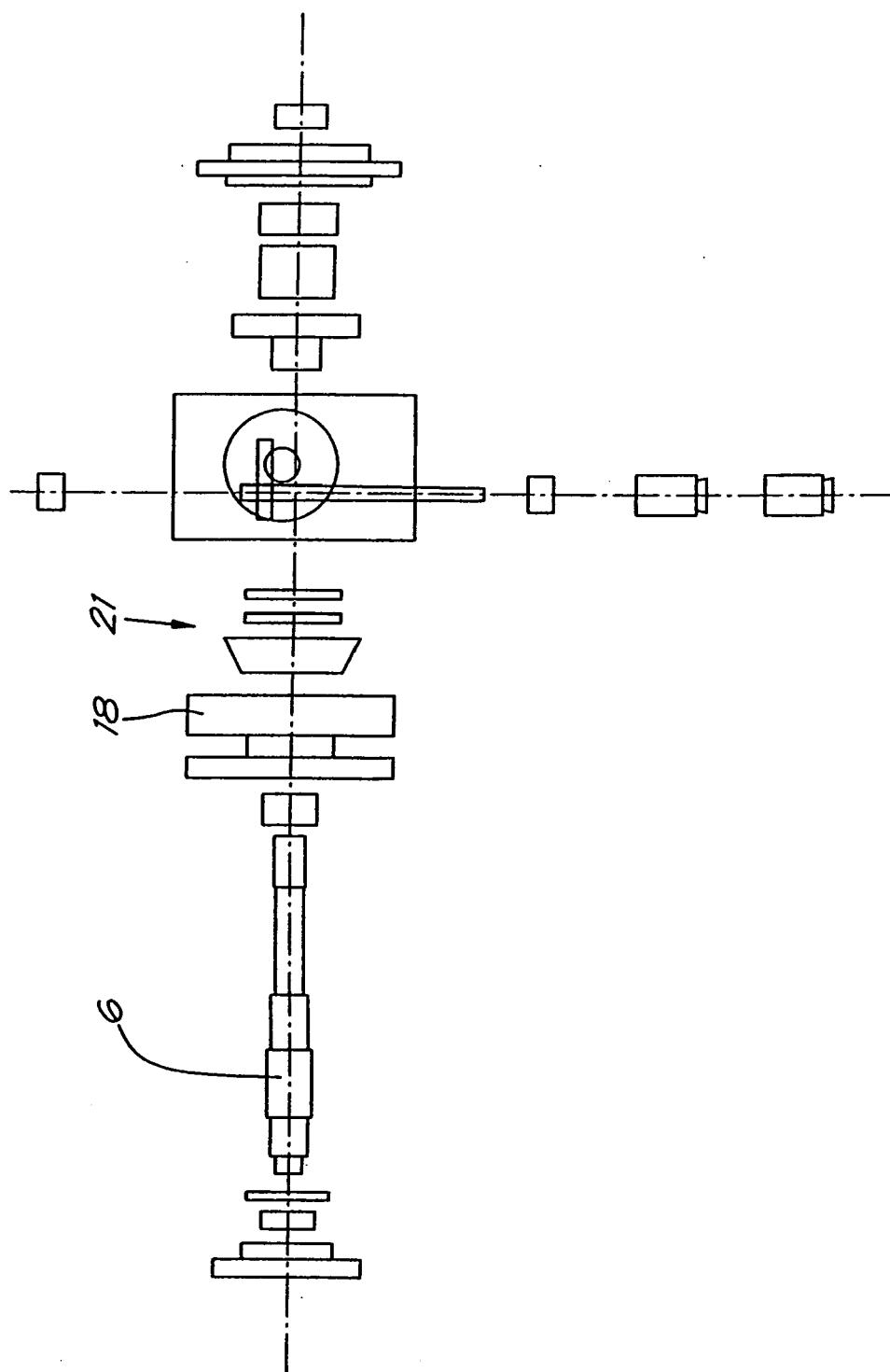
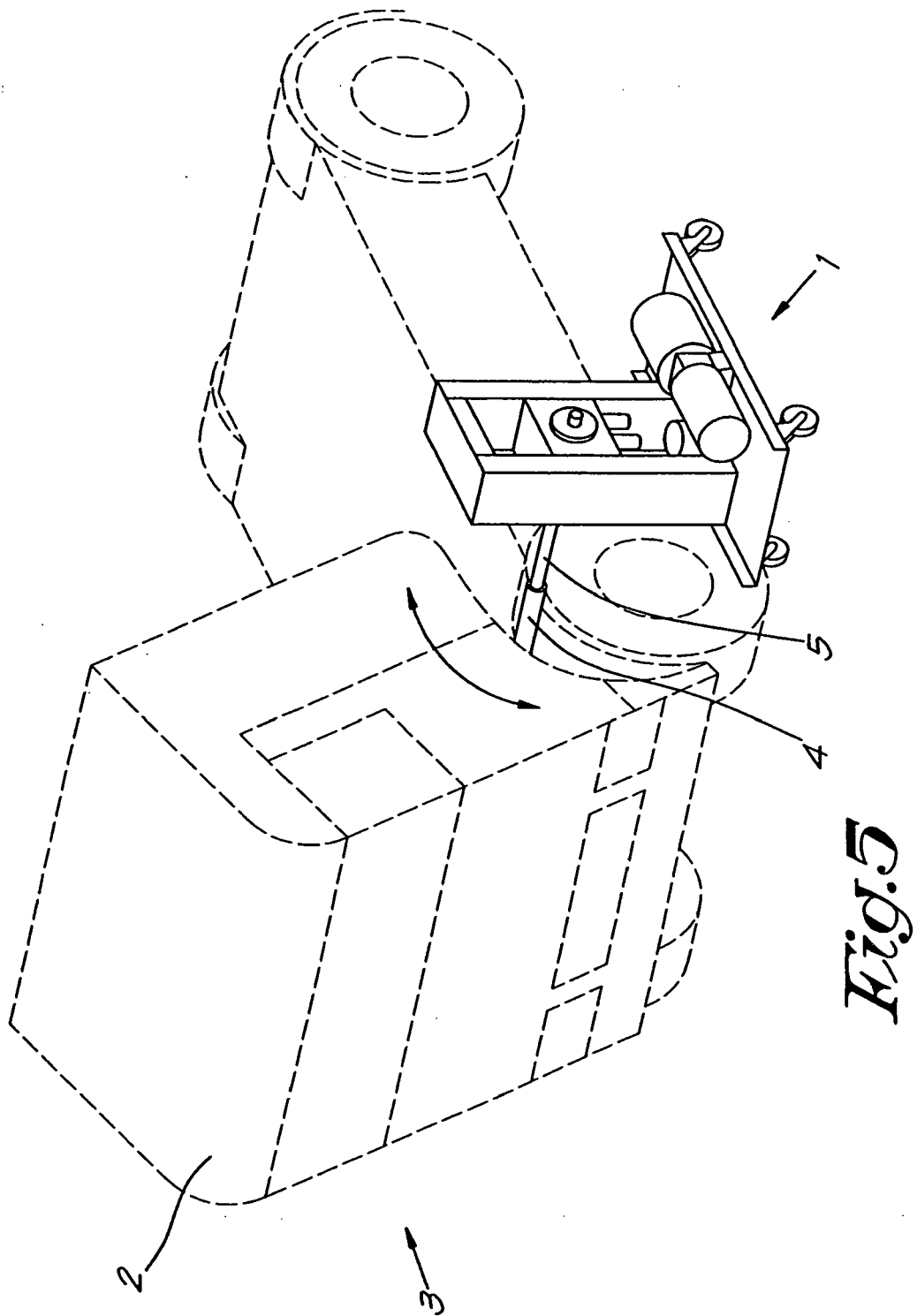


Fig. 4



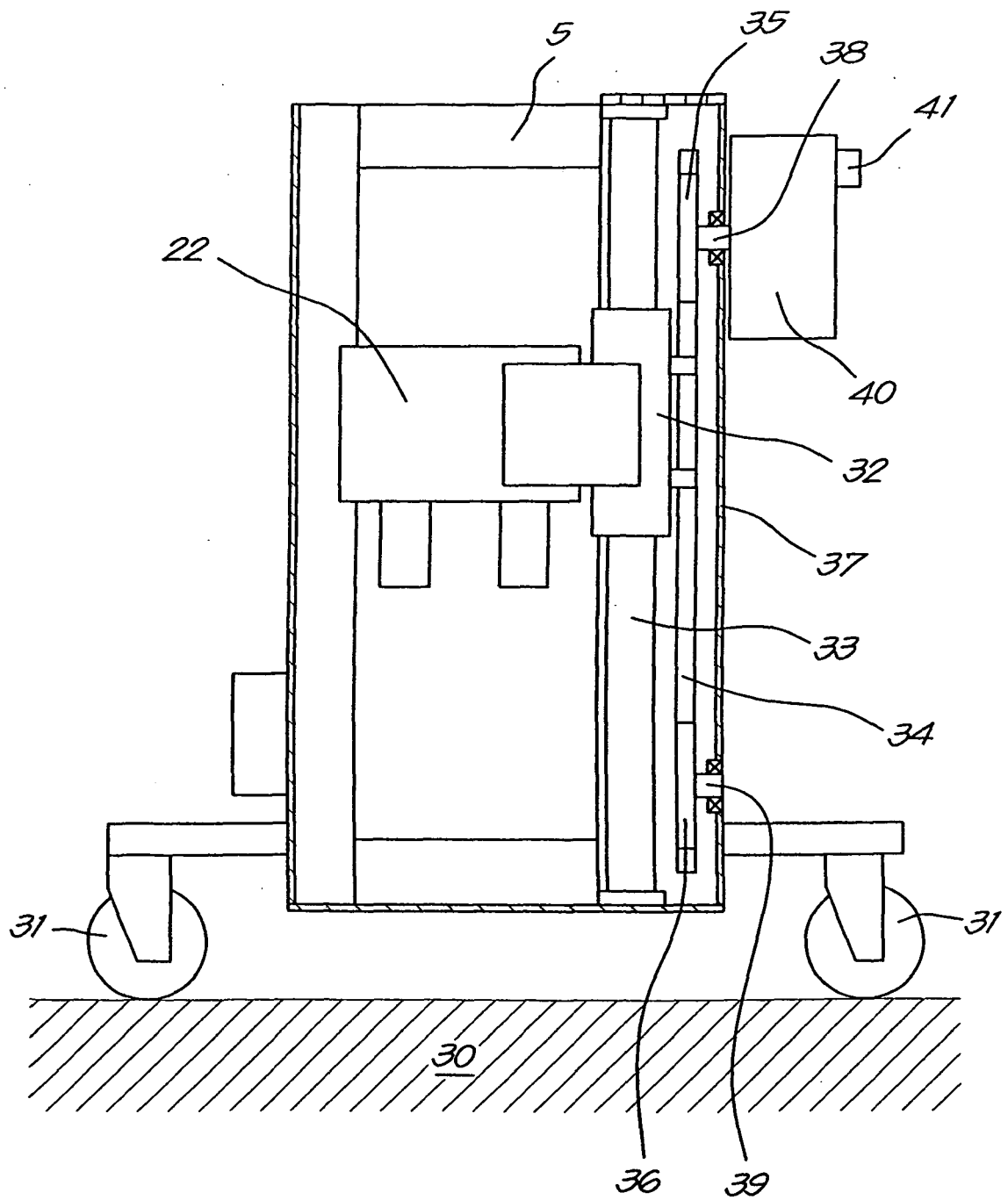


Fig. 6



EUROPEAN SEARCH REPORT

Application Number
EP 09 44 7060

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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