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(54) **A dismounting device and process for extracting a pumping unit from a fuel dispenser**

(57) The invention relates to a dismounting device (1) and a process for extracting a pumping unit (2) from a fuel dispenser (4).

The dismounting device (1) comprises a trolley (5) mobile with respect to the fuel dispenser (4), an arm (6) fixed to the trolley (5) at its first end (7) and comprising grasping means (8) at its second end (9) adapted to grasp

the pumping unit (2) and height setting means (10) to adjust the height of the dismounting device (1) in function to the height of the pumping unit (2).

The grasping means (8) comprises a pumping unit holder (11) at its lower part (12) to bear the pumping unit (2) and blocking means (13) at its upper part (14) to maintain the pumping unit (2).

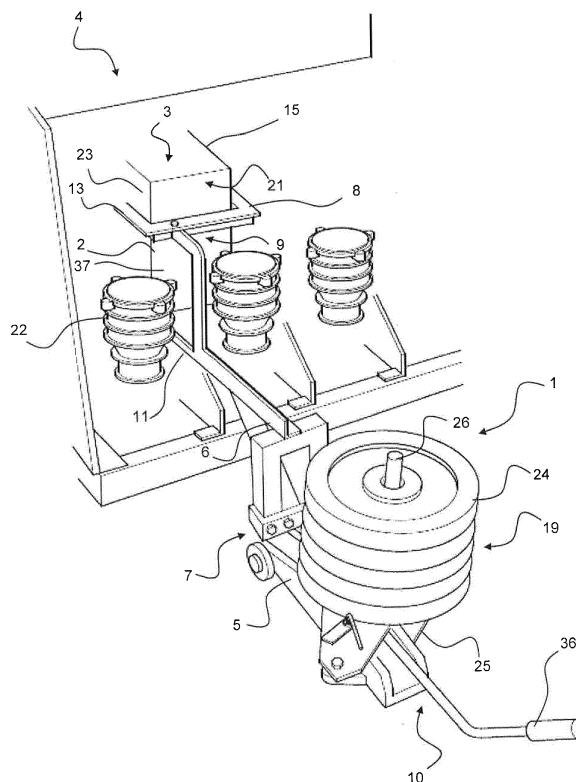


Figure 1

Description

[0001] The invention relates to a dismantling device and process for extracting a pumping unit from a fuel dispenser.

[0002] A service station comprises usually several fuel dispensers. A fuel dispenser can deliver gasoline or diesel fuel into the tank of the cars for instance.

[0003] A fuel dispenser comprises several compartments including a hydraulic compartment comprising one or several fuel pumps, an electronic compartment positioned above the hydraulic compartment and a compartment including the hose management systems.

[0004] A fuel pump comprises a pumping unit and a motor having a pulley driving another pulley fixed to the pumping unit by means of a transmission belt. The pumping unit comprises a pump body which is equipped with at least a filter with the function of eliminate the solid particles present in the fuel. A pumping unit can be linked to two fuel meters for delivering fuel on each side of the dispenser.

[0005] A hydraulic compartment can comprise more than two pumping units which are cumbersome and heavy. The pumping unit can have a weight of more than sixteen kilograms and the space inside the hydraulic compartment, between the pumping units and the motors, is limited to obtain a compact hydraulic assembly.

[0006] Sometimes, the pumping unit can malfunction. It must be removed from the hydraulic compartment to be replaced or restored on site. The dismantle operation is very difficult for the staff and two persons are needed to extract the pumping unit which is heavy. The access into the hydraulic compartment is limited. The operation takes a lot of time and it could be dangerous for the staff. In some cases, the employee can have its fingers broken or have its hands cut.

[0007] The aim of the invention is to solve these issues in providing a dismantling device and process for extracting a pumping unit from a fuel dispenser enabling to reduce the number of employee for extracting the pumping unit. A single employee is required instead of two. The cycle times in carrying out this activity is reduced. The labor time on-site is reduced and the cost is reduced.

[0008] Another aim of the invention is to enable the employees to make their job safely and easily.

[0009] To this end, the invention relates to a dismantling device for extracting a pumping unit from a fuel dispenser comprising:

- a trolley mobile with respect to the fuel dispenser,
- an arm fixed to the trolley at its first end and comprising grasping means at its second end adapted to grasp the pumping unit, the grasping means comprising a pumping unit holder at its lower part to bear the pumping unit and blocking means at its upper part to maintain the pumping unit,
- height setting means to adjust the height of the dismantling device in function to the height of the pump-

ing unit.

[0010] The invention enables a reduction in personnel. In order to comply with United Kingdom Hygiene and Security legislation, most pumping unit dismantling operations require two men on-site in order to safely lift the pumping unit. The dismantling process enables a single technician to do this job safely.

[0011] The invention enables to reduce the cycle-time for extraction. Typical time on-site for this operation is around two hours. The dismantling process permits to do this operation over one hour.

[0012] In different possible embodiments, the present invention also relates to the features which will appear during the following description and which should be considered individually or in all their technically possible combinations:

[0013] The blocking means comprises a "U" shaped part fixed in a movable manner to the upper part of the arm and a closing part fixed in a movable manner to the front face of the "U" shaped part forming a quadrilateral frame surrounding the top part of the pumping unit and blocking the pumping unit during the extraction operation.

[0014] The blocking means can be quickly and easily fixed to the arm. The shape of the blocking means is adapted to the shape of the upper part of the pumping unit.

[0015] The pumping unit holder has a fork shape. The fork shape permits to get around and avoid the fuel inlet of the pumping unit. When the pumping unit holder is inserted, the fuel inlet is positioned between the two legs of the pumping unit holder.

[0016] The arm is connectable and movable from the trolley via fixing means. The advantage is that the pumping unit holder can be manipulated and inserted under the pumping unit easily without the trolley which is cumbersome.

[0017] The dismantling device comprises weight setting means to adjust the weight of the trolley so as to be greater than the weight of the pumping unit.

[0018] It permits to dismount several kind of pumping unit of different weights.

[0019] The invention relates also to a dismantling process for extracting a pumping unit from a fuel dispenser with a dismantling device as defined above. The dismantling process comprises the steps of:

- inserting the pumping unit holder of the dismantling device under the pumping unit,
- setting the height of the dismantling device,
- fixing the arm of the dismantling device to the trolley,
- positioning the blocking means of the dismantling device around a top part of the pumping unit for maintaining the pumping unit,
- fixing the blocking means of the dismantling device at the upper part of the arm,
- extracting the pumping unit from the fuel dispenser.

[0020] In different possible embodiments, the present invention also relates to the features which will appear during the following description and which should be considered individually or in all their technically possible combinations:

[0021] The dismantling process comprises a step of setting the weight of the dismantling device to adjust its weight in function of the weight of the pumping unit.

[0022] The step of positioning the blocking means around the top part of the pumping unit comprises the steps of:

- inserting a "U" shaped part provided on the blocking means into the spaces located on either sides of the pumping unit,
- fixing the "U" shaped part to the upper part of the arm,
- closing the "U" shaped part with a closing part for forming a quadrilateral frame surrounding the top part of the pumping unit and blocking the pumping unit during the extraction step.

[0023] The invention will be described more in detail with reference to the appended drawings wherein:

- FIGURE 1 represents the dismantling device during a dismantling operation, according to the invention;
- FIGURE 2 represents a view of the pumping unit held by the dismantling device;
- FIGURE 3 represents another view of the pumping unit held by the dismantling device;
- FIGURE 4 represents a top view of the dismantling device without pumping unit.

[0024] As illustrated in figure 1, the fuel dispenser 4 comprises several fuel pumps 3.

[0025] Each fuel pump 3 comprises a motor having a pulley driving another pulley fixed to a back face of a pumping unit 2 by means of a transmission belt not shown.

[0026] A dismantling device 1 according to the invention is illustrated in figure 1. It is adapted to extract a pumping unit 2 from the hydraulic compartment of a fuel dispenser 4. It is also adapted to put in place a pumping unit 2 inside the hydraulic compartment of a fuel dispenser 4. The pumping unit 2 comprises a front face 21.

[0027] The pumping unit comprises a pump body 37 which is equipped with at least a filter 22 with the function of eliminate the solid particles present in the fuel. This filter 22 is usually called "inlet filter".

[0028] In the example of figure 1, the pulley of the pumping unit 2 is positioned at the back face of the pumping unit 2. The filter 22 protrudes on the front face 21 of the pumping unit 2.

[0029] The pumping unit 2 comprises a top cover 23 at its top part 15 closing the pump body 37. The pump body 37 and the top cover 23 have a parallelepiped shape. The filter 22 is positioned at the right of the front face 21 of the pumping unit 2 and under the top cover 23

in regard to the plan of figure 1. The top cover 23 forms the top part 15 of the pumping unit 2.

[0030] For extracting the pumping unit 2, the dismantling device 1 is placed in front of the front face 21 of the pumping unit 2.

[0031] The dismantling device 1 comprises a trolley 5 mobile with respect to the fuel dispenser 4 and an arm 6 fixed to the holder 5 at its first end 7. The arm 6 comprises grasping means 8 at its second end 9 adapted to grasp the pumping unit. The grasping means 8 comprises a pumping unit holder 11 at its lower part 12 and blocking means 13 at its upper part 14 for maintaining the pumping unit 2.

[0032] The dismantling device 1 comprises height setting means 10 provided on the trolley 5 to adjust the height of the arm 6 in function to the height of the pumping unit 2.

[0033] In the embodiment of figure 1, the trolley 5 comprises four rollers. The height setting means are integrated in the holder. In the embodiment of figure 1, the trolley is a floor jack as used for lifting cars to replace tires. Other kinds of trolley can be used. A handle 36 is provided on the trolley 5 to activate the lifting of the arm 6. Thus, the height of the arm 6 can be set at the same height of the top cover 23 of the recovery chamber.

[0034] The trolley 5 comprises weight setting means 19 for setting the weight of the trolley 5. Weights 24 can be added on the trolley 5. These weights 24 act as a counter weight. The trolley 5 weight is set so as to be greater than weight of the pumping unit 2, the arm 6 and the grasping means 8. Thus, the dismantling device 1 can be used to extract pumping unit 2 of different weights. A tray 25 is provided at the back of the trolley 5 to bear the weights 24. The tray 25 can comprise a vertical rod 26. The weights 24 comprise a hole. The vertical rod 26 is inserted into the hole. The weight setting means 19 are positioned at the back of the trolley 5.

[0035] The pumping unit weight can vary in function of the volume of fuel into the recovery chamber. The weight setting means 19 enable to adapt the pumping unit weight in function of the fuel inside the pumping unit 2.

[0036] Figures 2 and 3 represent a pumping unit held by the dismantling device after the extraction operation.

[0037] Figure 2 represent a different embodiment wherein the dismantling device 1 is placed in front of the rear face 21' of the pumping unit 2 for extracting the pumping unit 2. It is possible to extract the pumping unit according the two faces.

[0038] Figure 1 represents the preferred embodiment wherein the dismantling device 1 is placed in front of the front face 21 of the pumping unit 2 for extracting the pumping unit 2.

[0039] The top cover 23 of the pump body 37 has a parallelepiped shape. The blocking means 13 comprises a "U" shaped part 17 fixed in a movable manner at the upper part 14 of the arm 6 and a closing part 18 fixed in a movable manner to the front face 20 of the "U" shaped part 17 forming a quadrilateral frame blocking the pumping unit 2 during the extraction step. It prevents the pump-

ing unit 2 to fail down during and after the extraction step.

[0040] Said differently and as represented in figure 4, the blocking means 13 have a quadrilateral shape formed by four legs 27, 28, 29, 39 adapted to surround and to clamp the periphery of the top cover 23. The legs 27, 28, 29, 39 can be tubular for instance. The four legs 27, 28, 29, 39 form a rigid framework. The closing part 18 is formed by a front leg 39.

[0041] In particular, the "U" shaped part 17 is formed by three legs 27, 28, 29 including a left leg 27, a back leg 28 fixed to the arm and a right leg 29.

[0042] The "U" shaped part 17 is fixed in a removable manner to the arm 6, by a screw 38 for instance and the closing part 18 is fixed in a removable manner to the "U" shaped part 17 in order to provide blocking means 13 surrounding the periphery of the top cover 23 of the pumping unit.

[0043] The thickness of the right 29 and left 27 legs are adapted to be inserted in the tight space between two pumping units. For example, the left leg 27 can be thinner than the right leg 29.

[0044] The length of the legs 18, 27, 28, 29 is defined to be near to the dimension of the pumping unit periphery.

[0045] The legs 27, 28, 29, 39 are rectangular or circular. The front leg 39 is fixed to the ends of the right 29 and left 27 legs of the "U" shaped part 17.

[0046] According to the embodiment of figure 4, a first end of the front leg 39 is fixed to the front end of the right leg 29 by a screw 40. The screw 40 is not tightly bound against the front leg 39 enabling a free rotation of the front leg 39. The screw 40 is permanently screwed.

[0047] The left leg 27 has a circular section and a length greater than the right leg length.

[0048] The second end of the front leg 39 can be fixed to the left leg 27 by a slot 41 provided in the second end of the front leg 39 cooperating with the left legs 27. The end of the left leg 27 is inserted into the slot 41 for closing the blocking means 13.

[0049] As represented in figure 2, the arm 6 has a "L" shape including a horizontal part 30 linked to the trolley 5 via a lower vertical part 31, an upper vertical part 32 linked to the horizontal part 30 and an upper horizontal part 33. The blocking means 13 is fixed in a removable manner to the upper horizontal part 33. The horizontal part 30 is sensibly horizontal when the dismantling device 1 is on the ground. The lower vertical part 31 and the upper vertical part 32 are sensibly perpendicular to the horizontal part 30.

[0050] An inclined part 34 is provided under the arm 6 linking the arm 6 to the lower vertical part 31 in order to reinforce the assembly.

[0051] The blocking means 13 is fixed to the arm 6 in the vicinity of the left leg 27. The arm 6 is not fixed in the center of the back leg 28 of the blocking means 13 enabling to shift the arm 6 with respect to the filter 22 of the pumping unit 2. The arm 6 is shifted to the left of the pumping unit 2 according to figure 1. Thus the upper vertical part 32 of the arm is not incommoded by the filter

22 of the pumping unit 2 during the dismantling process.

[0052] Thus, when the blocking means 13 is fixed to the pumping unit, the upper vertical part 32 of the arm is sensibly parallel to the front face 21 of the pumping unit and is in the vicinity of this front face. The upper vertical part 32 of the arm extends along this front face 21 and along the filter 22.

[0053] The grasping means 8 as illustrated in figures 2 and 4 comprises a pumping unit holder 11 at its lower part 12 for holding the pumping unit during the extraction operation. The pumping unit holder 11 has a fork shape comprising two legs 35a, 35b extending sensibly in the same direction of the arm. The pumping unit holder 11 is linked to the horizontal part 30 of the arm. The legs 35a, 35b of the pumping unit holder 11 are sensibly parallel. For instance, the space between the two legs 35a, 35b of the pumping unit holder 11 can be comprised between 90 mm and 130 mm and is preferably of 110 mm.

[0054] A first leg 35a is straight and aligned with the horizontal part 30 of the arm. A second leg 35b has a first part 42 tilted with respect to the horizontal part 30 of the arm and a second part 44 parallel to the first leg 35a.

[0055] Some pumping units comprise a fuel inlet positioned on the bottom not shown. The advantage of the fork shape is that the legs 35a, 35b of the pumping unit holder 11 can be inserted under the pumping units avoiding the fuel inlet. When the pumping unit holder 11 is inserted, the fuel inlet is positioned between the two legs 35a, 35b of the pumping unit holder 11.

[0056] The lower vertical part 31 of the arm is connected to the trolley by means of fixing means 16 like screws for example. Thus the arm can be connected or removed from the trolley to facilitate the insertion of the pumping unit holder 11 under the pumping unit.

[0057] The invention relates also to a dismantling process for extracting a pumping unit 2 from a fuel dispenser 4 with a dismantling device 1 as defined above.

[0058] The dismantling process for extracting a pumping unit 2 from a fuel dispenser 4 comprises the prior steps of:

- removing the transmission belt from the pulley of the motor,
- removing the pulley of the pumping unit 2,
- extracting the motor from the fuel dispenser 4,
- removing the fixing means fixing the pumping unit to the fuel meter, and
- extracting the pumping unit 2 of the fuel pump 3 from the fuel dispenser 4 by means of the dismantling device 1 as defined above.

[0059] The dismantling process comprises the steps of:

- inserting the pumping unit holder 11 under the pumping unit 2,
- setting the height of the trolley 5,
- fixing the trolley 5 to the grasping means 8 and more

precisely to the lower vertical part 31 of the grasping means 8,

- setting the weight of the trolley 5 to adjust its weight in function of the weight of the pumping unit 2. The weight of the dismounting device 1 must be superior to the weight of the pumping unit,
- positioning the blocking means 13 around a top part 15 of the pumping unit 2 for maintaining the pumping unit 2. In the example of figure 2, the blocking means 13 are disposed around the top cover 23 of the pumping unit 2,
- fixing the blocking means 13 at the upper part 14 of the arm 6,
- extracting the pumping unit 2 from the fuel dispenser 4.

[0060] Figure 2 represents the dismounting device 1 when the blocking means 13 are positioned around the top part 15 of the pumping unit 2 for maintaining the pumping unit 2.

[0061] The steps above are preferably done successively. They also can be done in a different order.

[0062] For instance, the step of setting the weight of the trolley 5 can be done before the step of setting the height of the trolley 5 or the step of inserting the pumping unit holder 11 under the pumping unit 2. The step of setting the weight of the trolley 5 is done before the extraction step but whatever the other steps.

[0063] An alternative dismounting process is possible comprising the steps of:

- fixing the trolley 5 to the grasping means 8 and more precisely to the lower vertical part 31 of the grasping means 8,
- setting the height of the trolley 5 according to the height of the pumping unit,
- inserting the pumping unit holder 11 under the pumping unit 2,
- setting the weight of the trolley 5 to adjust its weight in function of the weight of the pumping unit 2,
- positioning the blocking means 13 around a top part 15 of the pumping unit 2 for maintaining the pumping unit 2. In the example of figure 4, the blocking means 13 are disposed around the top cover 23 of the pumping unit 2,
- fixing the blocking means 13 at the upper part of the arm 6,
- extracting the pumping unit 2 from the fuel dispenser 4.

[0064] The step of positioning the blocking means 13 around the top part of the pumping unit 15 comprises the steps of:

- inserting the "U" shaped part 17 of the blocking means 13 into the spaces located on either sides of the pumping unit 2,
- fixing the "U" shaped part 17 to the upper part 14 of

the arm 6,

- closing the "U" shaped part 17 with the closing part 18 for forming a quadrilateral frame blocking the pumping unit 2 during the extraction step.

[0065] When the pumping unit 2 is grasped by the dismounting device 1, the employee can pull the dismounting device 1 toward a direction opposite to the fuel dispenser 4 in order to extract the pumping unit 2 from the fuel dispenser 4.

[0066] During the extraction step, the bottom of the pumping unit 2 is born by the pumping unit holder 11 and the upper part 15 of the pumping unit 2 is maintained by the blocking means 13 safely.

[0067] As a result, the dismounting or the mounting operations can be done by only one employee instead of two and safely.

[0068] The dismounting device 1 can be used for mounting or replacing a pumping unit 2 into the hydraulic compartment of the fuel dispenser 4.

[0069] The invention relates also to a mounting process consisting in:

- setting the weight of the trolley 5 of the dismounting device 1 to adjust its weight in function of the weight of the pumping unit 2,
- fixing the trolley 5 to the grasping means 8 and more precisely to the lower vertical part 31 of the grasping means 8,
- fixing the "U" shaped part 17 to the upper part 14 of the arm 6,
- placing the pumping unit 2 in the grasping means 8,
- closing the "U" shaped part 17 with the closing part 18 for forming a quadrilateral frame blocking the pumping unit 2 during the mounting operation,
- translating the pumping unit 2 toward the fuel dispenser 4 by means of the dismounting device 1 to insert the pumping unit 2 inside the fuel dispenser 4,
- setting the height of the trolley 5. The pumping unit 2 is lifted up to the fuel meter.

[0070] The pumping unit 2 is thus sustained by the dismounting device 1 during the clamping of the pumping unit 2 to the meter or other components of the fuel dispenser 4. A single employee is needed for clamping the pumping unit 2 and there is no need for the employee to put its hands between two pumping units.

Claims

1. Dismounting device (1) for extracting a pumping unit (2) from a fuel dispenser (4), **characterized in that** it comprises:

- a trolley (5) mobile with respect to the fuel dispenser (4),
- an arm (6) fixed to the trolley (5) at its first end

- (7) and comprising grasping means (8) at its second end (9) adapted to grasp the pumping unit (2), the grasping means (8) comprising a pumping unit holder (11) at its lower part (12) to bear the pumping unit (2) and blocking means (13) at its upper part (14) to maintain the pumping unit (2), and
 - height setting means (10) to adjust the height of the dismantling device (1) in function to the height of the pumping unit (2). 5
2. Dismounting device (1) according to claim 1, **characterized in that** the blocking means (13) comprises a "U" shaped part (17) fixed in a movable manner to the upper part (14) of the arm (6) and a closing part (18) fixed in a movable manner to the front face (20) of the "U" shaped part (17) forming a quadrilateral frame surrounding the top part (15) of the pumping unit (2) and blocking the pumping unit (2) during the extraction operation. 10
3. Dismounting device (1) according to claim 2, **characterized in that** the pumping unit holder (11) has a fork shape. 15
4. Dismounting device (1) according to anyone of claims 1 to 3, **characterized in that** the arm (6) is connectable and movable from the trolley (5) via fixing means (16). 20
5. Dismounting device (1) according to anyone of claims 1 to 4, **characterized in that** it comprises weight setting means (19) to adjust the weight of the trolley (5) so as to be greater than the weight of the pumping unit (2). 25
6. Dismounting process for extracting a pumping unit (2) from a fuel dispenser (4) with a dismantling device (1) as defined by anyone of claims 1 to 5 **characterized in that** it comprises the steps of: 30
- inserting the pumping unit holder (11) of the dismantling device (1) under the pumping unit (2),
 - setting the height of the dismantling device (1), 35
 - fixing the arm (6) of the dismantling device (1) to the trolley (5),
 - positioning the blocking means (13) of the dismantling device (1) around a top part (15) of the pumping unit (2) for maintaining the pumping unit (2), 40
 - fixing the blocking means (13) of the dismantling device (1) at the upper part (14) of the arm (6),
 - extracting the pumping unit (2) from the fuel dispenser (4). 45
7. Dismounting process according to claim 6, **characterized in that** it comprises a step of setting the weight of the dismantling device (1) to adjust its weight in function of the weight of the pumping unit (2). 50

8. Dismounting process according to anyone of claims 6 or 7, **characterized in that** the step of positioning the blocking means (13) around the top part (15) of the pumping unit comprises the steps of:
- inserting a "U" shaped part (17) provided on the blocking means (13) into the spaces located on either sides of the pumping unit (2),
 - fixing the "U" shaped part (17) to the upper part (14) of the arm (6),
 - closing the "U" shaped part (17) with a closing part (18) for forming a quadrilateral frame surrounding the top part (15) of the pumping unit (2) and blocking the pumping unit (2) during the extraction step. 55

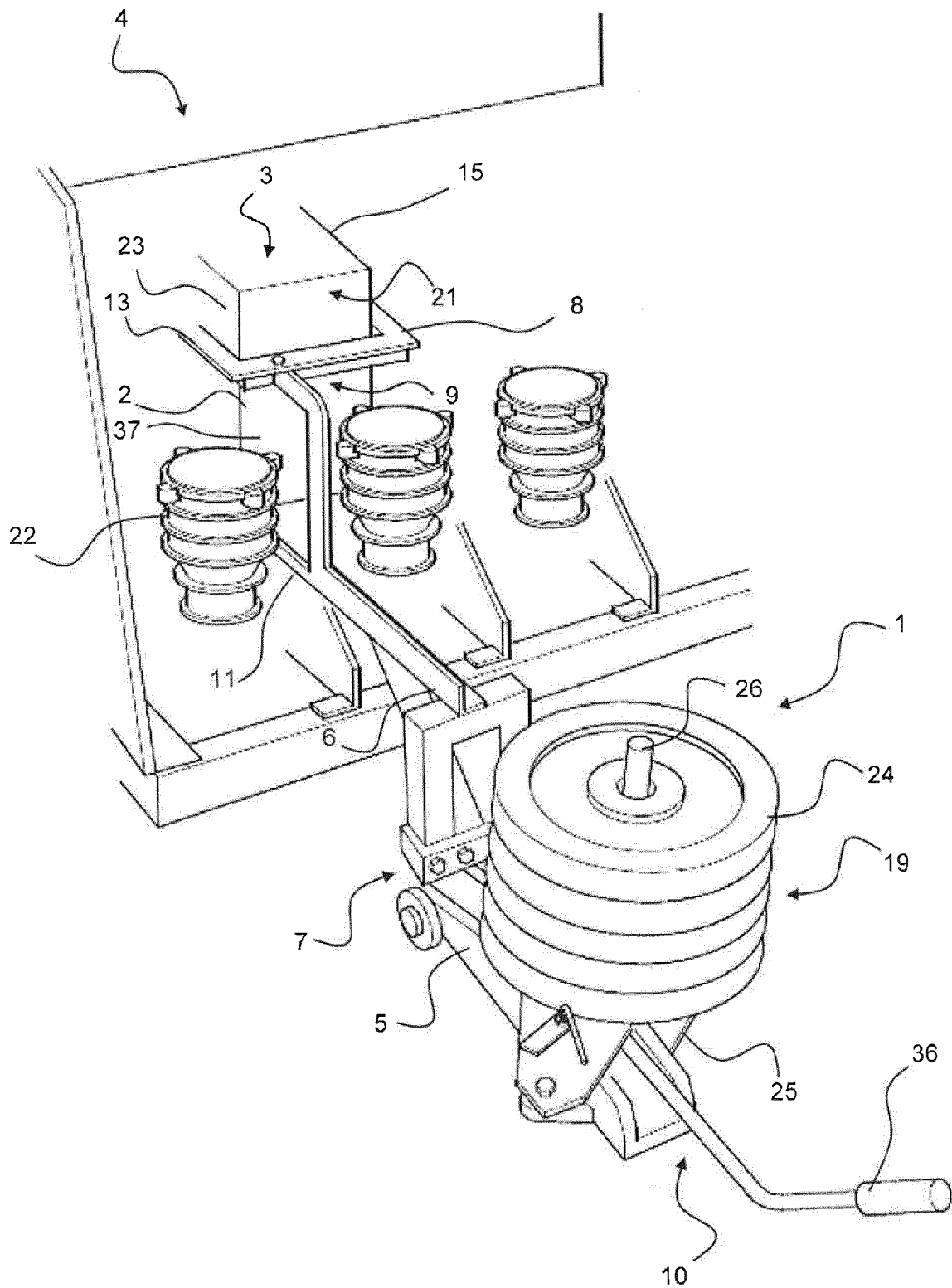


Figure 1

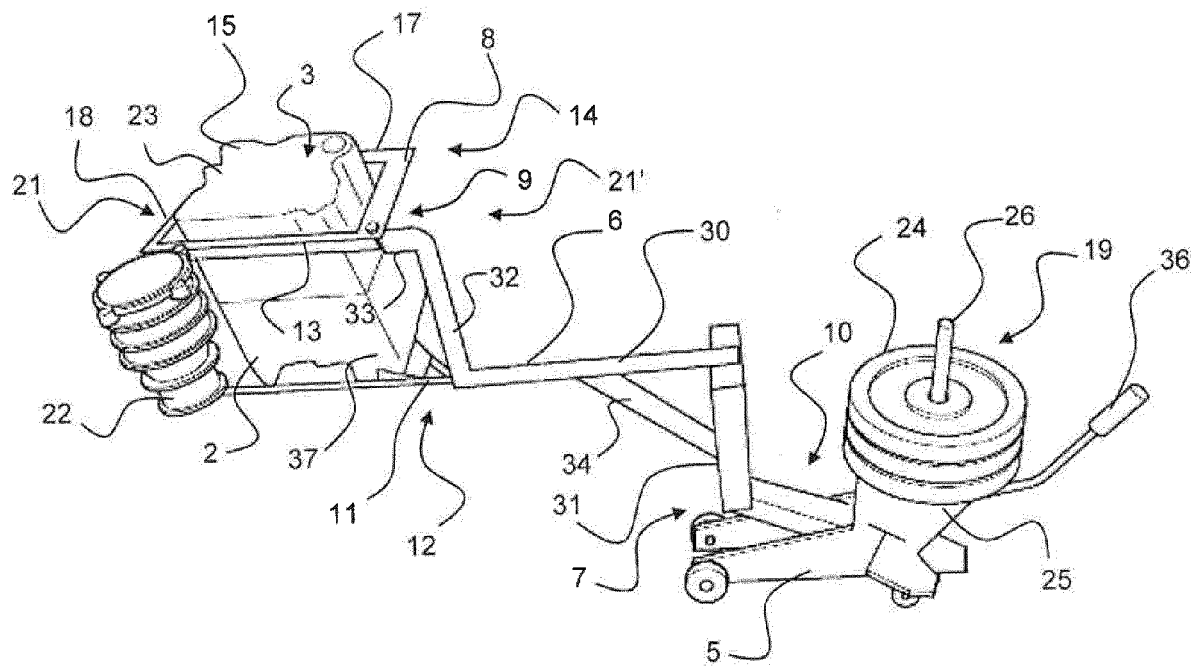


Figure 2

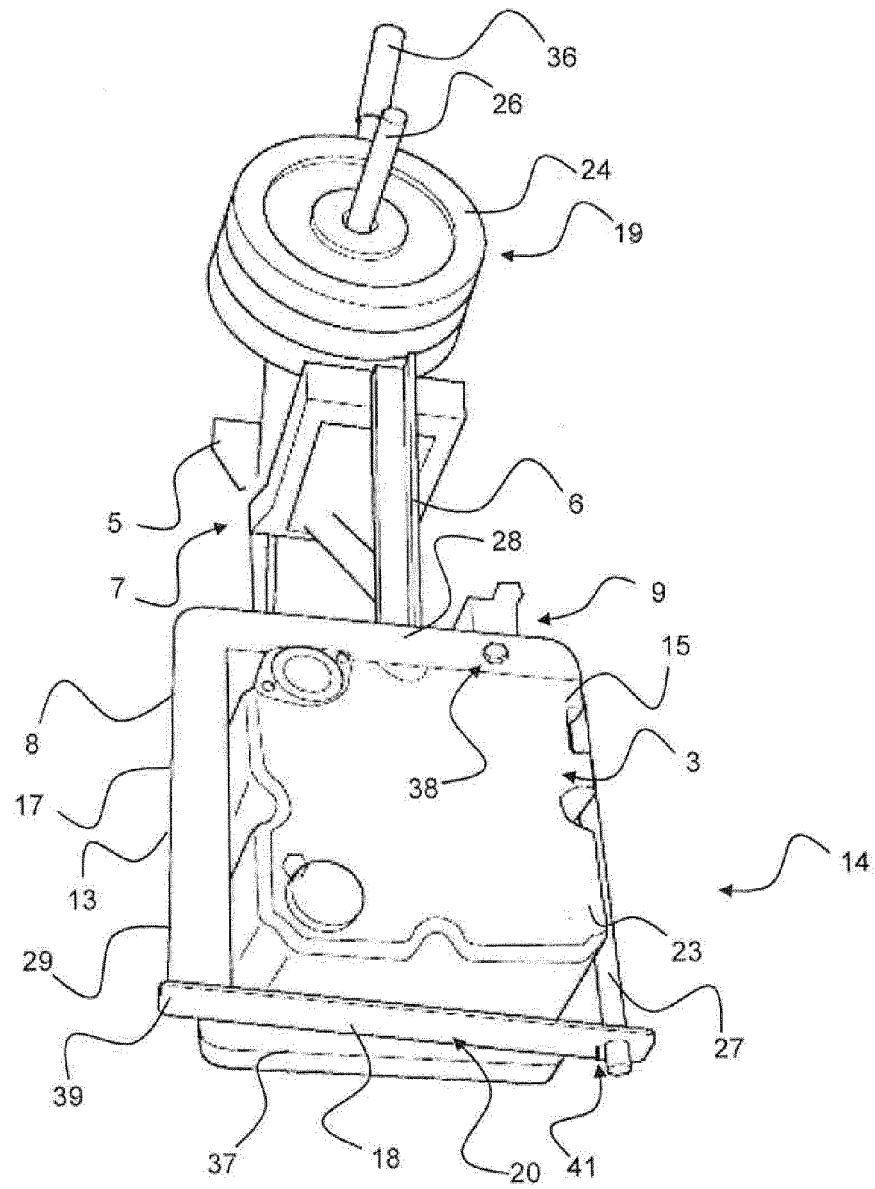


Figure 3

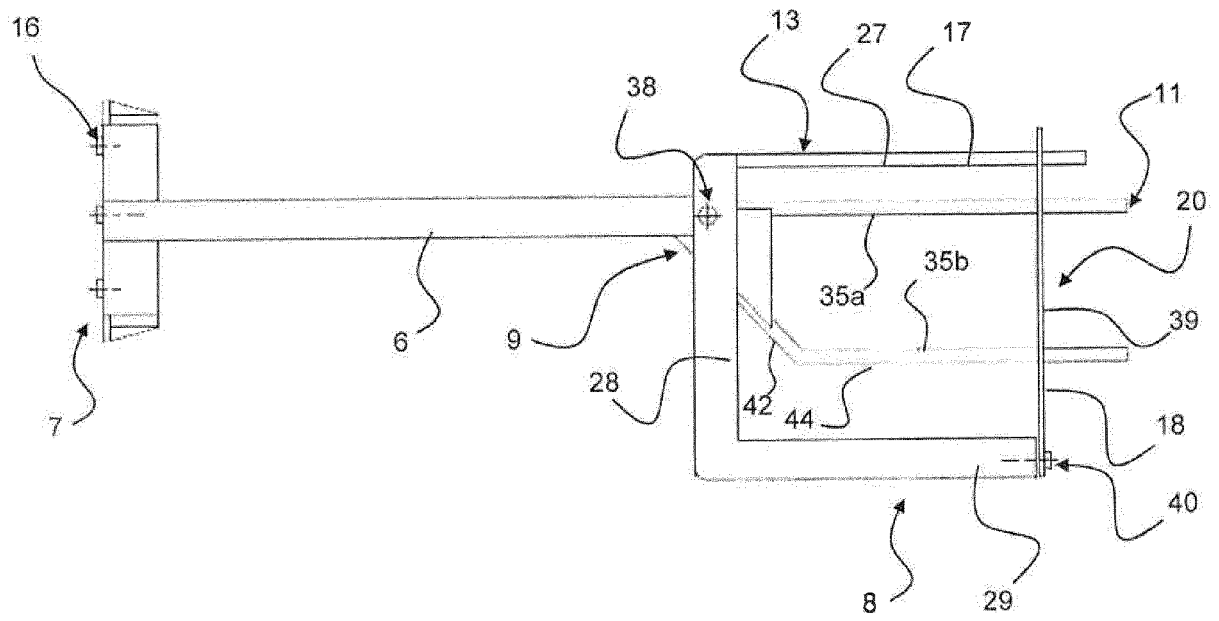


Figure 4



EUROPEAN SEARCH REPORT

Application Number
EP 14 18 9640

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A	* figure 2 *	4	
	* paragraph [0035] *		

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 30 January 2015	Examiner Guthmuller, Jacques
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

EPO FORM 1503 03.02 (P04C01)



EUROPEAN SEARCH REPORT

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CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone		T : theory or principle underlying the invention	
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A : technological background		D : document cited in the application	
O : non-written disclosure		L : document cited for other reasons	
P : intermediate document		& : member of the same patent family, corresponding document	

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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