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(54) Device and method for handling a hose

(57) A device for handling of a hose (5), which device allows the hose (5) to be pulled out from a hose storage space (6) and is adapted to return the hose (5) to the hose storage space (6). The device comprises a hose returning means comprising a rocker unit (9) which, to allow pulling out and returning of the hose, is pivotable relative to the hose storage space (6) about a pivot axis (12) and which comprises a hose supporting part (11) which is arranged at a distance from the pivot axis (12) and adapted to support the hose (5). Moreover, a method for handling of a hose as well as a fuel pump assembly are described.

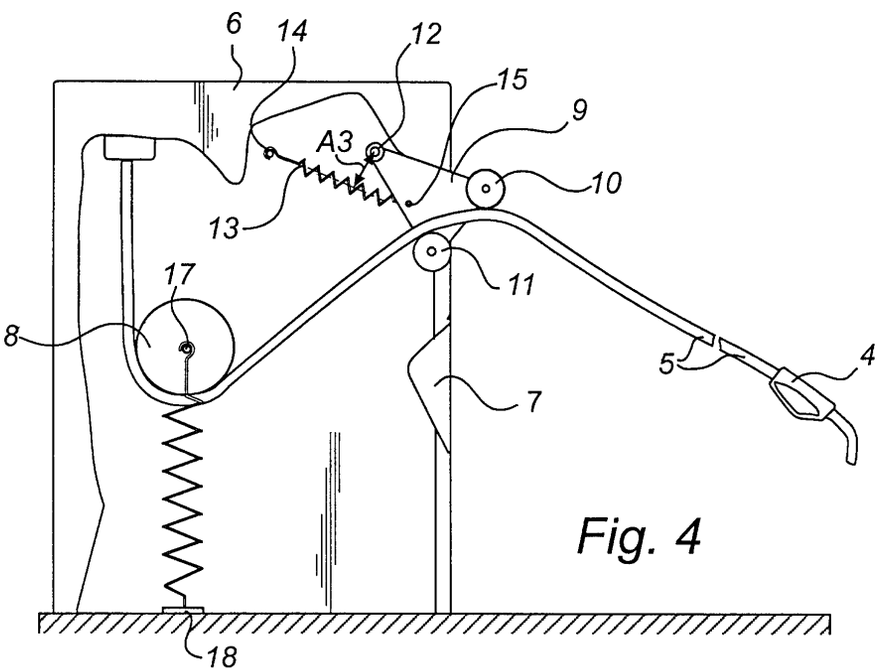

Fig. 4

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Description

Field of the Invention

[0001] The present invention relates to a device and a method for handling of a hose according to the preamble to the respective independent claims. The invention also concerns a fuel pump assembly.

Background Art

[0002] A fuel pump typically comprises a pump part standing on the ground, a display part positioned above the pump part and showing the chosen type of petrol, cash readout, volume readout etc, and a column to which one or more petrol hoses are connected.

[0003] When the tank of a vehicle is to be filled up, the driver parks the vehicle beside the petrol pump and opens the cover or cap of the vehicle's petrol tank. Then the driver selects the desired type of petrol and places the pump nozzle mounted at the end of the hose in the inlet of the vehicle's petrol tank and puts in the desired volume of petrol.

[0004] In some types of payment procedures, it is necessary to pay before filling-up can be started. For instance, charge card payment must in most cases be initiated by means of a card and code in an associated terminal before the pump is activated.

[0005] A difficulty that may arise in connection with filling-up is that the hose does not reach to the vehicle if parked a distance from the petrol pump. The reason why the vehicle has not been parked sufficiently close to the pump may be difficulty in manoeuvring owing to a limited space round the petrol pump. It may also happen that the vehicle is first parked at a terminal for charge card payment. In that case the hose is usually not long enough and the driver must move the vehicle once more, which is time-consuming, so that it stands close to the petrol pump. To allow the hose to reach to the vehicle, it is usually necessary for the driver to park his vehicle so that the side of the vehicle where the filler cap is positioned faces the petrol pump. It is not always known to a driver of an unfamiliar vehicle whether the filler cap is positioned on the left or right side. This may result in the driver by mistake parking the vehicle on the wrong side of the pump and thus not being able to fill up the tank without moving the vehicle to the other side of the petrol pump since the hose does not reach all the way round the vehicle.

[0006] One way of facilitating access to the petrol pump is to provide it with a longer hose. This may, however, cause problems since a longer hose may tend to land on the ground when not used and thus get stuck in or be damaged by passing cars or other vehicles. To prevent this, the column may be provided with some kind of returning mechanism for the hose.

[0007] A fuel pump with automatic return of the hose to the column is disclosed in EP-A1-0 379 742. In this prior-art construction, the hose extends in the column round a number of stationary small rolls and round a spring-loaded wheel which is vertically movable. The hose is fixed to the ceiling of the column at the rear side and is passed along the rear side down and round the wheel. From the wheel the hose is passed upwards at the front side to the rolls and then over the rolls to the rear side of the column. The hose is hanging freely down from the rolls and has thus been made to extend one turn in the column.

[0008] The spring load causes the hose to be pulled into the column after use, but also acts in a counteracting manner when pulling out the hose. The counteracting effect gives the drawback that it will be heavy work to pull out the hose, and it is therefore common that a driver does not utilise the advantages of a longer hose in terms of parking the vehicle further away from or on an optional side of the petrol pump. If the spring load is reduced for the purpose of reducing the counteracting force, the hose will not be pulled in just as efficiently and risks remaining outside the column after use.

[0009] A further example of such a construction is disclosed in EP-B1-0 255 979, which however also suffers from the above drawbacks as to returning action and counteracting force.

[0010] One more example of a similar construction is disclosed is NL-A-8 403 718. As is evident from the drawings of this publication, the construction comprises a vertically movable, spring-loaded wheel and a fixedly mounted wheel round which wheels the hose extends inside the column. The hose is fixed to the ceiling of the column and is passed along the rear side of the column down and round the movable wheel. From there the hose is passed up along the front side to the fixedly mounted wheel and then over the fixedly mounted wheel to the rear side of the column. The hose is hanging freely down from the fixedly mounted wheel and has thus been made to extend one turn in the column. Similar to the above constructions, also this one suffers from corresponding problems as to returning action and counteracting force.

[0011] An additional example of returning mechanism is disclosed in PCT Application WO 00/15542. A problem of this returning mechanism is that the hose exits close to the ground, which means that the hose may easily be dragging on the ground. Besides, pulling out such a hose is a sluggish operation while at the same time the available hose length is small relative to the volume of the hose storage space.

Summary of the Invention

[0012] An object of the present invention is to provide a solution to the above problems by improving handling of a hose in connection with a petrol pump.

[0013] According to the invention, this object is achieved by a device having the features as defined in claim 1. Preferred embodiments are stated in claims

2-11. The object is also achieved by a method according to claim 12. Preferred embodiments are stated in claims 12-22. Moreover the object is achieved by a fuel pump assembly according to claim 23.

[0014] The device according to the invention is characterised in that it has a hose returning means comprising a rocker unit which to allow pulling out and returning of the hose is pivotable in relation to the hose storage space about a pivot axis. The rocker unit comprises a hose supporting part which is arranged at a distance from the pivot axis and is adapted to support the hose.

[0015] By the hose being supported by a rocker unit, the hose can easily be pivoted outwards on the occasions when a longer hose is required. Since the hose is pivoted outwards and thus straightened out, a longer hose is obtained without much counteracting force having to be overcome. A straightened hose which abuts against a wheel or a roll at a small angle of contact is considerably easier to pull out compared with a hose which abuts against a wheel or a roll at a great angle of contact. The angular motion also causes excellent return of the hose since it is usually more important for the last part of the hose to be acted upon by a transverse force directed towards the hose storage space than to be really pulled back along its longitudinal direction.

[0016] The rocker unit is preferably adapted, while pivoting about the pivot axis for pulling out of the hose, to store at least part of the energy that corresponds to the work of pulling out the hose in the form of potiential energy for returning the hose. As a result, the return of the hose can take place without some kind of external energy supply.

[0017] According to a preferred embodiment of the invention, the rocker unit is adapted to be pivoted in a first direction when pulling out the hose and, when returning the hose, to be pivoted by a rocker returning means which applies a returning force on the rocker unit at a distance from the pivot axis in a second direction which is opposite to the first direction. This gives the advantage that technically simple solutions can be selected to provide the returning force and still obtain efficient return of the hose to the column. Moreover a robust construction is obtained, which causes safe return of the hose.

[0018] The rocker returning means is preferably adapted to apply the returning force in such manner that a moment lever of the returning force relative to the pivot axis is gradually extended while returning the hose. This gives, inter alia, the advantage that the returning force gradually decreases when pulling out the hose, whereby it will be easier to pull out the hose and utilise its length. Moreover the return will be most efficient since the return acts with great force when returning the last part of the hose, which reduces the risk of the hose being damaged.

[0019] The above-mentioned rocker returning means suitably comprises a spring element, which gives the advantage of a simple construction which is both space-saving and reliable.

[0020] According to a preferred embodiment of the invention, the device for handling the hose further comprises one more hose returning means which cooperates sequentially with the rocker unit. This gives the advantage that a longer hose can be stored in the column and, when necessary, be pulled out. Pulling out will not be the same heavy work as in conventional columns provided with hose returning means, since the returning force is shared by two hose returning means which do not operate in a counteracting manner simultaneously. The hose which the device is capable of returning is at least of the same length or in many cases longer than the hose which a conventionally designed hose returning device can return when both hose returning devices act with the same counteracting force while pulling out the hose.

[0021] The two hose returning means are preferably adapted to store, in the form of potential energy, at least part of the energy that corresponds to the work that is required to pull out the hose. As a result, this energy can be used to provide the return of the hose.

[0022] The hose returning means are suitably adapted to allow sequential pulling out of the hose and store energy sequentially, which strengthens the above advantages.

[0023] Moreover, the hose returning means are suitably adapted to return the hose sequentially, which further emphasises the above advantages.

[0024] According to a preferred embodiment of the invention, at least one of the hose returning means applies on the hose a returning force which increases gradually while returning the hose. As a result, the advantage is obtained that, when returning the outermost part of the hose, a sufficiently great force acts to introduce this part into the column, without the counteracting force in pulling out being unnecessarily great.

[0025] Furthermore, the returning force, which during returning is the last to act on the hose, is preferably adapted to apply on the hose a returning force which increases gradually while returning the hose. This increases the above advantage still more when returning the outermost part of the hose.

[0026] The inventive method is characterised in that, during pulling out of the hose, a rocker unit, which is pivotable relative to the hose storage space, is pivoted about a pivot axis. The rocker unit supports the hose by means of a hose supporting part which is arranged at a distance from the pivot axis, and the rocker unit returns, after use, the hose to the storage space.

[0027] By the hose being supported by a rocker unit, the hose can easily be pivoted outwards on the occasions when a longer hose is required. Since the hose is pivoted outwards and thus straightened out, a longer hose is obtained without much counteracting force having to be overcome. A straightened hose which abuts against a wheel or a roll at a small angle of contact is considerably easier to pull out compared with a hose which abuts against a wheel or a roll at a great angle of

contact. The angular motion also causes excellent return of the hose since it is usually more important for the last part of the hose to be acted upon by a transverse force directed towards the hose storage space than to be really pulled back along its longitudinal direction.

[0028] The fuel pump assembly according to the invention is characterised in that it has a device for handling of hose of the above-mentioned type. This gives the advantage that the hose is safely returned and does not remain outside the assembly after use, which is particularly important in connection with inflammable liquids, such as petrol, diesel or other fuels, that could leak out if the hose is damaged. Besides, the hose returning device of the above type requires less space compared with prior-art hose returning devices with a corresponding hose length capable of being pulled out.

Brief Description of the Drawings

[0029] The invention will now be described in more detail with reference to the accompanying schematic drawings which by way of example illustrate a currently preferred embodiment of the invention.

[0030] Fig. 1 is a front view of a fuel pump assembly.

[0031] Fig. 2 is a side view of the interior of a hose storage space.

[0032] Figs 3 and 4 correspond to Fig. 2, but illustrate other positions of the hose.

Detailed Description of the Preferred Embodiment

[0033] As is evident from Fig. 1, the main components of the fuel pump assembly are a column 1, a pump housing 2 and a display unit 3. The fuel pump assembly is connected to an underground fuel container (not shown). When filling up the tank of a vehicle, the fuel is pumped from the underground container by means of a pump P which is located in the pump housing 2, and from there to the column 1 and out to a nozzle 4 via a fuel hose 5. When filling-up does not take place, the fuel hose 5 is accommodated in a hose storage space 6 and the nozzle 4 is inserted in a nozzle boot 7.

[0034] As is evident from Fig. 2, the fuel hose 5 is connected to the fuel piping of the fuel pump assembly in an upper and, relative to the user, rear portion of the hose storage space 6. The hose 5 is passed down round a deflecting roll 8 which is positioned in a lower and, relative to the user, rear portion of the hose storage space 6. From the roll 8, the fuel hose 5 is passed upwards in the hose storage space 6 and supported by a rocker unit 9 which is located in an upper and, relative to the user, front portion of the hose storage space 6. From the rocker unit 9, the fuel hose 5 is hanging in a bend and deflects upwards once more since the nozzle 4 arranged at the end of the fuel hose 5 is inserted into the nozzle boot 7 which is positioned approximately in the middle of the column 1 in the vertical direction and at the side of the column 1 which is the front side relative to the user.

[0035] The deflecting roll 8 is spring loaded and adapted to be moved in the vertical direction when pulling out and returning the fuel hose 5. The rocker unit 9 is also spring loaded and adapted to be pivoted when pulling out and returning the hose 5. The movement and function of these two components will now be described in more detail.

[0036] The rocker unit 9 comprises a guide roll 10 and a supporting roll 11 which are arranged on the rocker unit 9 so as to form, together with the pivot axis 12 of the rocker unit 9, a triangle where the pivot axis 12 is located at the top and the guide roll 9 and the supporting roll 11 are located at the bottom. The guide roll 10 is located closer to the front end in relation to the supporting roll 11, and the two rolls 10, 11 are located on either side of the hose 5.

[0037] When a user intends to use the fuel pump assembly, he removes the nozzle 4 from the boot 7 and pulls the fuel hose 5 outwards. In this operation, the rocker unit 9 will be pivoted out towards the user since the fuel hose 5 will abut against the guide roll 10 and pull the rocker unit 9 outwards. The hose 5 will still be supported by the supporting roll 11. The length of hose obtained in this operation is the length that was positioned in the downward loop from the supporting roll 11 to the nozzle 4 plus a shorter piece of hose that extended between the roll 8 and the supporting roll 11 and that will be accessible by the hose 5 being slightly straightened.

[0038] To return the hose 5, the rocker unit 9 is provided with a spring 13 which is adapted to return the rocker unit 9 and, thus, the hose 5 to its initial position (see Fig. 2) after use. The spring 13 is a tension spring whose one end is fixed at a fixing point 14 in the interior of the hose storage space 6 and whose other end is fixed at a fixing point 15 which is positioned on the rocker unit 9 between the pivot axis 12 and the supporting roll 11, i.e. at a distance from the pivot axis 12. The fixing point 14 is positioned at approximately the same level as the pivot axis 12, which, while pivoting the rocker unit 9 upwards, causes the perpendicular distance A1, A2, A3 between the pivot axis 12 and the power line of the spring 13, i.e. the moment lever, to be shortened. The spring 13 stores the energy that is necessary for pulling out the hose 5 in the form of potential energy. By selecting the suitable relative positions of the fixing points 14 and 15 in relation to the pivot axis 12, and also selecting the spring constant of the spring 13, it is possible to achieve solutions where the hose returning force is optimised as regards return of the hose 5 and the required pulling-out force is optimised as regards user-friendliness. For instance, in the positions where the user has the least favourable working position, it may be ensured that the counteracting force exerted by the return spring 13 is as small as possible, while it may be ensured that the returning force is as great as possible in the last part of the return movement to ensure that the hose 5 is re-

turned into the hose storage space 6.

[0039] When the hose 5 has been pulled out to the position shown in Fig. 3, further pulling out of the hose 5 will make the roll 8 move essentially vertically upwards as illustrated in Fig. 4. In this vertical movement of the roll 8, an additional hose length is obtained, which can be used to pull out the hose to an incorrectly parked vehicle or round a vehicle to the other side to reach the tank connection of the vehicle. The roll 8 is connected to a spring 16 which is stretched when pulling out the hose 5. The spring 16 which is a tension spring is connected at one end to a fixing point 17 which accompanies the roll 8 and at the other end to a fixing point 18 which is fixed relative to the hose storage space 6. The spring 16 stores the work that is necessary to pull out the hose 5 in the form of potential energy. Since the vertical movement of the roll 8 in cooperation with the movement of the rocker unit 9 away from the hose storage space straightens out the hose 5, a great hose length is obtained relative to the work that is necessary to pull out the same.

[0040] The manner in which the fuel pump assembly is intended to be used will now be described. The driver who intends to fill up the tank of his vehicle drives to the side of the fuel pump assembly. The driver then chooses the type of fuel and removes the nozzle 4 from the boot 7. When pulling out the hose 5, first the rocker unit 9 will be pivoted towards the user. In this pivoting motion, the spring 13 will store the work that is required in the form of potiential energy. If the nozzle 4 reaches the tank connection of the vehicle, the filling-up is started. If the vehicle is parked so that the nozzle 4 does not reach the tank connection of the vehicle, the driver will pull the hose 5 further, and as a result the rocker unit 9 will possibly be pivoted further, but above all the roll 8 will be moved vertically upwards. Also in this case, the spring 16 will store the work that is required in the form of potential energy. When the filling-up is completed, the driver will remove the nozzle 4 from the tank connection of the vehicle and let the hose move back as first the spring 16 of the roll 8 and then the spring 13 of the rocker unit 9 return the hose 5 to the hose storage space 6. Owing to this sequential effect between the rocker unit 9 and the roll 8 both when pulling out and returning the hose 5, it is possible to optimise the return function while at the same time the construction can be made very user-friendly.

[0041] It will be appreciated that many modifications of the embodiment described are feasible within the scope of the invention, which is defined in the appended claims.

[0042] For instance, the rocker unit can obtain other forms which satisfy the corresponding geometric conditions of pivot axis and fixing points. Moreover, the tension springs can be replaced with an optional spring or another element having the corresponding function, such as some kind of coil-spring-loaded fairlead or the like. One of the springs, or both, can each also be replaced with a weight.

[0043] According to an alternative embodiment, one and the same spring is used to return both the rocker unit and the roll. In this case, the sequential effect can be obtained, for example by the rocker unit and the roll being connected to the spring with a different degree of extension of the spring. The rocker unit can, for example, be secured to one end of the spring while the roll is secured to the spring by means of a hook which is arranged on the spring and engages the roll after the spring has been stretched by a certain length.

[0044] The hose storage space can be a more or less open space instead of the shown space which is relatively closed. The important thing is that the hose is returned to a position where it cannot be touched by passing vehicles or the like.

[0045] The hose supporting roll of the rocker unit can also be replaced with some kind of pin or some other construction which supports the hose and does not provide much resistance when pulling out the hose. In the same manner, the guide roll can be replaced with a pin or the like.

Claims

1. A device for handling of a hose (5), which device allows the hose (5) to be pulled out from a hose storage space (6) and which is adapted to return the hose (5) to the hose storage space (6), **characterised by** a hose returning means comprising a rocker unit (9) which, to allow pulling out and returning of the hose (5), is pivotable in relation to the hose storage space (6) about a pivot axis (12) and which comprises a hose supporting part (11) which is arranged at a distance from the pivot axis (12) and adapted to support the hose (5).

2. A device as claimed in claim 1, in which the rocker unit (9), when pivoting about the pivot axis (12) for pulling out of the hose (5), is adapted to store at least part of the energy which corresponds to the work of pulling out the hose (5) in the form of potential energy for returning of the hose (5).

3. A device as claimed in claim 1 or 2, in which the rocker unit (9) is adapted to be pivoted in a first direction when pulling out the hose (5) and, when returning the hose (5), be pivoted by a rocker returning means (13), which applies a returning force on the rocker unit at a distance from the pivot axis (12) in a second direction which is opposite to the first direction.

4. A device as claimed in claim 3, in which the rocker returning means (13) is adapted to apply the returning force in such manner that a moment lever (A1, A2, A3) of the returning force relative to the pivot

axis (12) is gradually extended when returning the hose (5).

5. A device as claimed in claim 3 or 4, in which the rocker returning means comprises a spring element (13).

6. A device as claimed in any one of the preceding claims, which further comprises a second hose returning means (8) which cooperates sequentially with the first hose returning means (9).

7. A device as claimed in claim 6, in which both hose returning means (8, 9) are adapted, when pulling out the hose (5), to store at least part of the energy which corresponds to the work of pulling out the hose (5) in the form of potential energy.

8. A device as claimed in claim 6 or 7, in which said hose returning means (8, 9) are adapted to allow sequential pulling out of the hose (5) and store energy sequentially.

9. A device as claimed in any one of claims 6-8, in which the hose returning means (8, 9) are adapted to return the hose (5) sequentially.

10. A device as claimed in any one of claims 6-9, in which at least one of the hose returning means (8, 9) applies on the hose (5) a returning force which increases gradually while returning the hose (5).

11. A device as claimed in any one of claims 6-10, in which the hose returning means (9) which, during returning of the hose (5) is the last to act on the hose (5), applies on the hose (5) a returning force which increases gradually while returning the hose (5).

12. A method for handling a hose (5), in which the hose (5) for use is pulled out from a hose storage space (6) and after use is returned to the hose storage space (6), **characterised in that**

when pulling out the hose (5), a rocker unit, which is pivotable in relation to the hose storage space (6), is pivoted about a pivot axis (12), the hose (5) being supported by the rocker unit (9) via a hose supporting part (11) which is arranged at a distance from the pivot axis (12), and

the rocker unit (9), after use of the hose (5), is pivoted back and returns the hose (5) to the storage space (6).

13. A method as claimed in claim 12, in which the rocker unit (9), during pivoting about the pivot axis (12) for pulling out of the hose (5), stores at least part of the energy which corresponds to the work of pulling out the hose (5) in the form of potential energy for returning the hose (5).

14. A method as claimed in claim 12 or 13, in which the rocker unit (9) is pivoted in a first direction when pulling out the hose (5) and, when returning the hose, is pivoted by a rocker returning means (13) which applies a returning force on the rocker unit (9) at a distance from the pivot axis (12) in a second direction which is opposite to the first direction.

15. A method as claimed in claim 14, in which the rocker returning means (13) applies the returning force in such a manner that a moment lever (A1, A2, A3) of the returning force relative to the pivot axis (12) is gradually extended during returning of the hose (5).

16. A method as claimed in claim 14 or 15, in which the rocker returning means is made to operate as a spring element (13).

17. A method as claimed in any one of claims 12-16, in which a second hose returning means (8) cooperates sequentially with the first hose returning means (9).

18. A method as claimed in claim 17, in which both hose returning means (8, 9), when pulling out the hose (5), store at least part of the energy which corresponds to the work of pulling out the hose (5) in the form of potential energy.

19. A method as claimed in claim 17 or 18, in which said hose returning means (8, 9) allow sequential pulling out of the hose (5) and store energy sequentially.

20. A method as claimed in any one of claims 17-19, in which the hose returning means (8, 9) return the hose (5) sequentially.

21. A method as claimed in any one of claims 17-20, in which at least one of the hose returning means (9) applies on the hose (5) a returning force which increases gradually while returning of the hose (5).

22. A method as claimed in any one of claims 17-21, in which the hose returning means (9) which is the last to act on the hose when returning the hose (5), applies on the hose (5) a returning force which increases gradually while returning the hose (5).

23. A fuel pump assembly, such as a petrol pump, **characterised in that** it has a hose handling device as claimed in any one of claims 1-11.

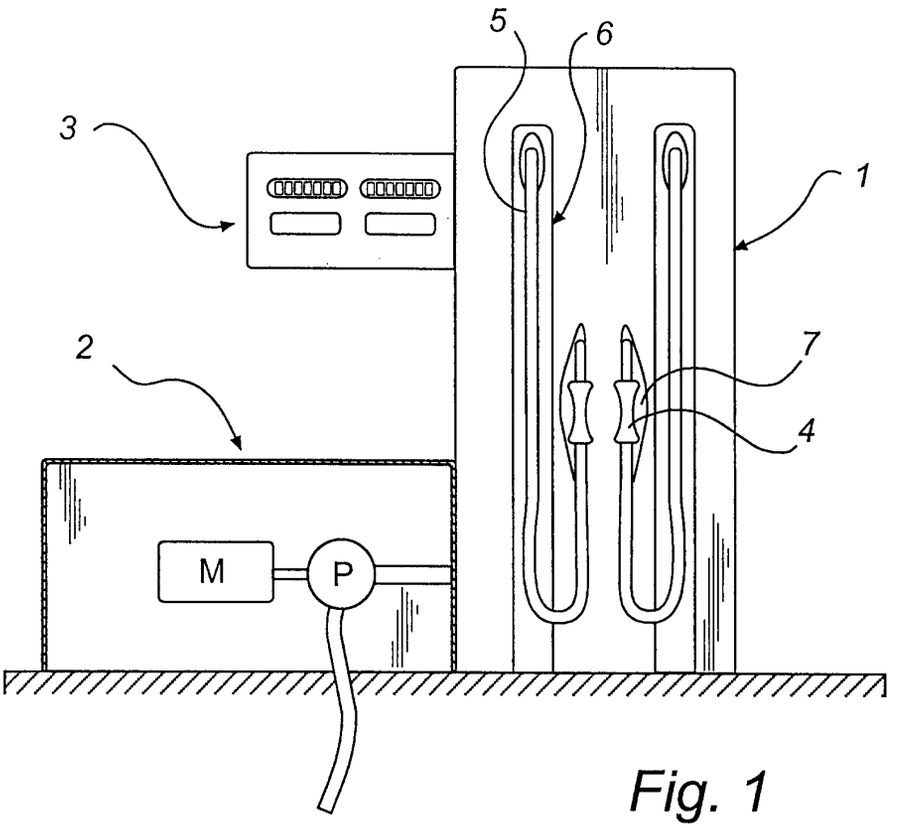

Fig. 1

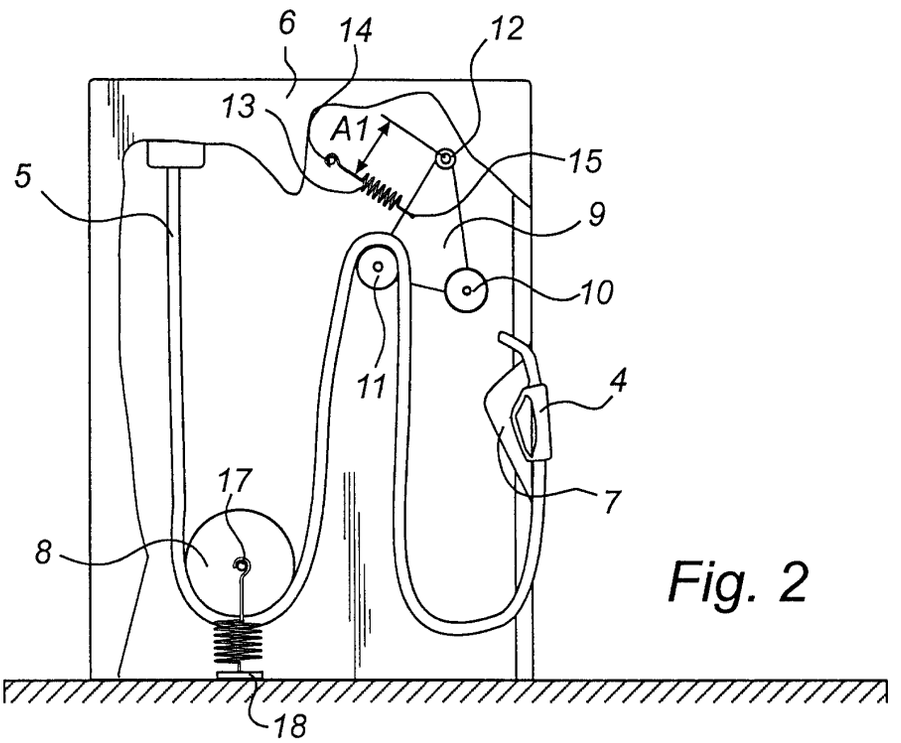

Fig. 2

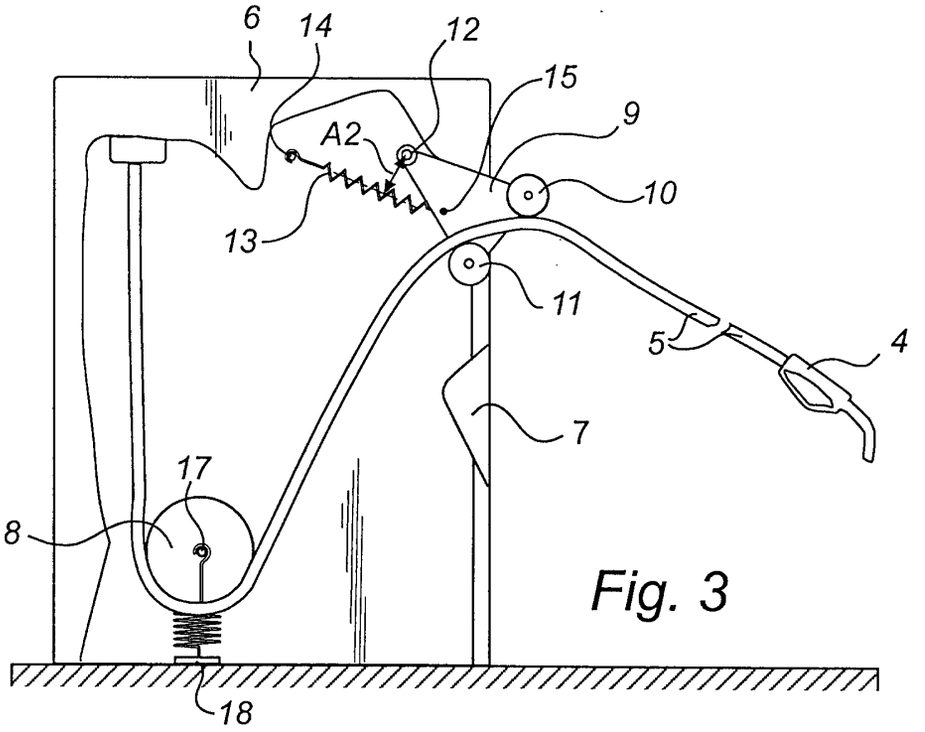

Fig. 3

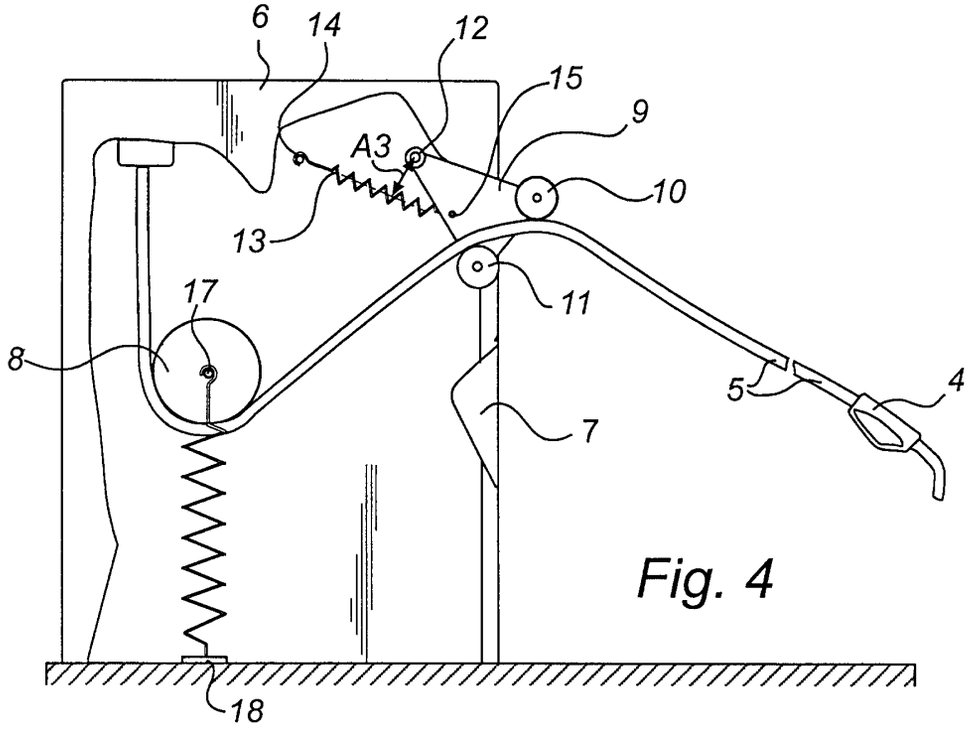

Fig. 4

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 02 44 5040

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.7)
X	FR 2 069 988 A (ENROULEUR ELECT MODERNE) 10 September 1971 (1971-09-10) * page 3, line 34 - line 37 * * page 5, line 1 - line 5 * * page 6, line 1 - line 3 * * figure 1 *	1-3,5,6, 12-14, 16,17,23	B67D5/365
X	US 2 770 499 A (RAPISARDA EDWARD D) 13 November 1956 (1956-11-13) * column 1, line 32 - line 48 * * column 2, line 30 - line 41 * * figures 1,3,7 *	1,6,12, 17,23	
X	DE 88 06 268 U (TANKANLAGEN SALZKOTTEN GMBH) 23 June 1988 (1988-06-23) * figures 1,4 *	1	
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P,X	US 6 334 457 B1 (BAKER IV FRANK A) 1 January 2002 (2002-01-01) * figures 2,5 *	1	TECHNICAL FIELDS SEARCHED (Int.Cl.7) B67D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	3 September 2002	Martínez Navarro, A.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 02 44 5040

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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03-09-2002

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82