(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 778 115 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
17.09.2014 Bulletin 2014/38

(51) Int Cl.:
B67D 7/34 *(2010.01)* ***B67D 7/42*** *(2010.01)*
B67D 7/84 *(2010.01)*

(21) Application number: **13159553.0**

(22) Date of filing: **15.03.2013**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(71) Applicant: **Dresser Wayne AB**
202 15 Malmö (SE)

(72) Inventor: **Larsson Bengt I.**
274 53 Skivarp (SE)

(74) Representative: **Winblad, Christian et al**
Awapatent AB
P.O.Box 5117
200 71 Malmö (SE)

(54) **A fuel dispensing unit for refueling a vehicle**

(57) A fuel dispensing unit (1) comprising a nozzle (3) for dispensing fuel, said nozzle (3) comprising a magnet means (6), a nozzle boot (4) adapted to hold said nozzle (3), said nozzle boot (4) comprising a sensor means (7) adapted to detect said magnet means (6), and a control unit (5) connected to said sensor means (7) and adapted to receive information from said sensor means (7).

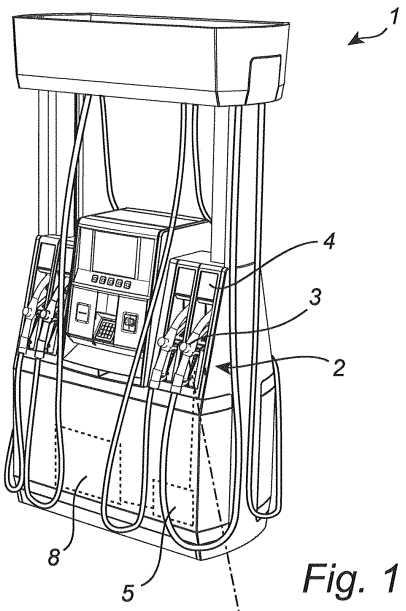


Fig. 1

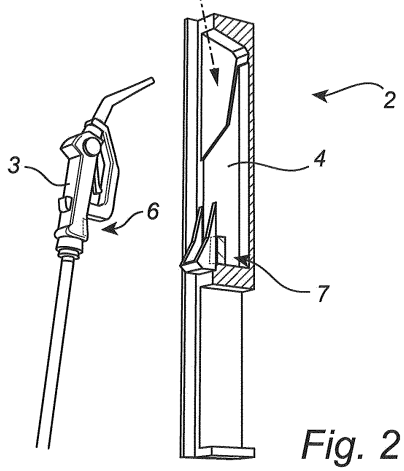


Fig. 2

EP 2 778 115 A1

Description

Technical field

[0001] The field of the invention generally relates to a fuel dispensing unit comprising a nozzle for dispensing fuel, a nozzle boot adapted to hold said nozzle, and a control unit.

Background art

[0002] Various techniques are available on the market to protect fuel dispensing units in case of burglary and other tampering for the purpose of steeling fuel. An example of such a technique is an anti-theft system with some kind of tamper/damage-detecting sensor, which breaks a switch, which thus gives or breaks a signal between the fuel dispensing unit and a central unit which then loses contact with the fuel dispensing unit. The loss of this contact initiates some kind of alarm and inactivates the fuel dispensing unit, which serves to prevent use of the fuel dispensing unit. Inactivation involves, for instance, setting a logic variable in the control system of the pump at a certain value so that that pumping is not allowed or, in a mechanical control system, activating a mechanical stop which physically prevents pumping.

[0003] A drawback of the above-described anti-theft system is that it can relatively easily be tampered with so as to allow theft of fuel. By existing components being bypassed, joined with tape, broken to pieces or replaced with other components, the fuel dispensing unit can be started so that theft of fuel can take place. A further problem is that the system can be tampered with so as to be reset and thus not indicate that undue use has been made.

Summary of the invention

[0004] Embodiments of the invention include a fuel dispensing unit comprising a nozzle for dispensing fuel, a nozzle boot adapted to hold said nozzle, and a control unit.

[0005] Such embodiments generally aim at providing a fuel dispensing unit with an improved anti-theft system in relation to prior art, which is easily mounted and makes unlawful pumping of fuel difficult.

[0006] In one embodiment, a fuel dispensing unit comprising a nozzle for dispensing fuel, said nozzle comprising a magnet means, a nozzle boot adapted to hold said nozzle, said nozzle boot comprising a sensor means adapted to detect said magnet means, and a control unit connected to said sensor means and adapted to receive information from said sensor means. The fuel dispensing unit is **characterized in that** said control unit is adapted to shift said fuel dispensing unit between a pumping state and a non-pumping state based on said information from said sensor means. When the fuel dispensing unit has been used to refuel a motor vehicle the nozzle is placed back in the nozzle boot. The sensor means provided in the nozzle boot will detect the magnet means in the nozzle send that information to the control unit which in turn will turn off the pump of the fuel dispensing unit, thereby place said fuel dispensing unit in a non-pumping state. This is advantageous in that as soon as the refueling process is completed the fuel dispensing unit will be placed in a non-pumping state preventing manipulation of the fuel dispensing unit.

[0007] The control unit may be adapted to place said fuel dispensing unit in an alarm state if said information does not correspond to a preset information. The alarm state may comprise shifting said fuel dispensing unit to a non-pumping state, and optionally at least one of sounding an alarm, preventing a shift to pumping state and sending an alarm message. This is advantageous in that if the control unit detects that the information received from the sensor means does not correspond to a preset information the fuel dispensing unit will be shut down. Manipulation of the fuel dispensing unit when in the alarm state will not be possible.

[0008] The magnet means may comprise a first and a second magnet element and the sensor means may comprise a sensor element, said sensor element being adapted to detect said first and second magnet elements and said control unit being adapted to receive information from said sensor element. The control unit may be adapted to place said fuel dispensing unit in an alarm state when receiving information from said sensor element stating that only one of said first and second magnet elements has been detected by the sensor element within a predetermined time period. In this embodiment, when the nozzle is placed back in the nozzle boot, the sensor element provided in the nozzle boot will first detect the first magnet element provided in the nozzle and thereafter detect the second magnet element provided in the nozzle within said predetermined time period. If both magnet elements are detected, within said predetermined time period, that information will be sent to the control unit which in turn will place said fuel dispensing unit in a non-pumping state. If, however, only one of the first and second magnet elements has been detected by the sensor element within a predetermined time period the fuel dispensing unit will be placed in an alarm state. This makes the arrangement extremely hard to manipulate. A potential thief must know in advance which components are included in the arrangement and how they are placed to be able to manipulate the arrangement. In addition, the system is effective, cheap and easy to implement.

[0009] The magnet means may comprise a magnet element and the sensor means may comprise a first and a second sensor element, said first and second sensor elements being adapted to detect said magnet element and said control unit being adapted to receive information from said first and second sensor elements. The control unit may be adapted to place said fuel dispensing unit in an alarm state when receiving information from said first

and second sensor elements stating that that only one of said sensor elements has detected said magnet element within a predetermined time period. In this embodiment, when the nozzle is placed back in the nozzle boot, the first sensor element provided in the nozzle boot will first detect the magnet element provided in the nozzle and thereafter the second sensor element will detect the magnet element provided in the nozzle, within said predetermined time period. If the magnet element is detected by both the first and second sensor element, within said predetermined time period, that information will be sent to the control unit which in turn will place said fuel dispensing unit in a non-pumping state. If, however, one of said first and second sensor elements has detected said magnet element within a predetermined time period the fuel dispensing unit will be placed the fuel dispensing unit will be placed in an alarm state. The same advantages as presented for the earlier described embodiments also apply for this embodiment.

[0010] The magnet means may comprise a first and a second magnet element and the sensor means may comprise a first and a second sensor element, said first sensor element being adapted to detect said first magnet element, said second sensor element being adapted to detect said second magnet element, and said control unit being adapted to receive information from said first and second sensor elements. The control unit may be adapted to place said fuel dispensing unit in an alarm state when receiving information from said first and second sensor elements stating that only one of said first magnet element and second magnet element has been detected within a predetermined time period. In this embodiment, when the nozzle is placed back in the nozzle boot, the first sensor element provided in the nozzle boot will detect the first magnet element provided in the nozzle and thereafter the second sensor element will detect the second magnet element provided in the nozzle, within said predetermined time period. If the first magnet element is detected by the first sensor element and the second magnet element is detected by the second sensor element, within said predetermined time period, that information will be sent to the control unit which in turn will place said fuel dispensing unit in a non-pumping state. If, however, only one of said first magnet element and second magnet element has been detected by the sensor elements, within a predetermined time period, the fuel dispensing unit will be placed in an alarm state. The same advantages as presented for the earlier described embodiments also apply for this embodiment.

[0011] The magnet means may comprise a first, a second and a third magnet element and the sensor means may comprise a sensor element, said sensor element being adapted to detect said first, second and third magnet elements and said control unit being adapted to receive information from said sensor element. The control unit may be adapted to place said fuel dispensing unit in an alarm state when receiving information from said sensor element stating that only one or two of said first, second and third magnet elements has been detected by the sensor element within a predetermined time period. In this embodiment, when the nozzle is placed back in the nozzle boot, the sensor element provided in the nozzle boot will detect the first, second and third magnet elements provided in the nozzle, in a subsequent order, within said predetermined time period. If all of the magnet elements are detected by the sensor element in a correct order, within said predetermined time period, that information will be sent to the control unit which in turn will place said fuel dispensing unit in a non-pumping state. If, however, only one or two of said first, second and third magnet elements has been detected by the sensor element, within a predetermined time period, the fuel dispensing unit will be placed in an alarm state. The same advantages as presented for the earlier described embodiments also apply for this embodiment.

[0012] The sensor means may comprise any one chosen from the group consisting of a magnetic switch and a Hall effect sensor. Using these types of sensors it is possible to make the fuel dispensing unit more intelligent in order to in turn make the fuel dispensing unit harder to manipulate. This will be described further in the detailed description of the application.

[0013] According to another aspect, a nozzle for a fuel dispensing unit is provided. The nozzle comprises a magnet arrangement which is adapted to be detected by a sensor arrangement provided in said fuel dispensing unit, such that said fuel dispensing unit may be shifted between different states based on information from said sensor arrangement. The different states may, for example, be a pumping state, a non-pumping state and an alarm state.

[0014] Generally, all terms used in the claims are to be interpreted according to their ordinary meaning in the technical field, unless explicitly defined otherwise herein. All references to "a/an/the [element, device, component, means, step, etc.]" are to be interpreted openly as referring to at least one instance of said element, device, component, means, step, etc., unless explicitly stated otherwise.

[0015] As used herein, the term "comprising" and variations of that term are not intended to exclude other additives, components, integers or steps.

[0016] Naturally, the fuel dispensing unit may be shifted from the non-pumping state to the pumping state in the same way (but in a reverse order) as from the pumping state to the non-pumping state as described for the different embodiments above.

[0017] The predetermined time period may be any suitable time period. Any one of the embodiments of the invention may also be applied without the use of a predetermined time period, i.e. by merely detecting the magnet means by means of the sensor means independently of time.

Brief description of the drawings

[0018] The above, as well as additional features and advantages of the embodiments of the invention, will be better understood through the following illustrative and non-limiting detailed description of embodiments of the invention, with reference to the appended drawings, where the same reference numerals will be used for similar elements, and wherein:

Fig. 1 is a perspective view of a fuel dispensing unit according to a first embodiment of the invention,
Fig. 2 is an exploded view of a nozzle and a nozzle boot of the fuel dispensing unit in Fig. 1,
Fig. 3 is a side view of the nozzle and the nozzle boot of the fuel dispensing unit according to a second embodiment of the invention,
Fig. 4 is a side view of the nozzle and the nozzle boot of the fuel dispensing unit according to a third embodiment of the invention,
Fig. 5 is a side view of the nozzle and the nozzle boot of the fuel dispensing unit according to a fourth embodiment of the invention, and
Fig. 6 is a side view of the nozzle and the nozzle boot of the fuel dispensing unit according to a fifth embodiment of the invention.

Detailed description

[0019] Fig. 1 illustrates a fuel dispensing 1 unit according to a first exemplary embodiment of the invention. In Fig. 2, a nozzle 3 and a nozzle boot 4 of the fuel dispensing unit 1 in Fig. 1 is illustrated in an exploded view. The fuel dispensing unit 1 comprises a nozzle 3, a nozzle boot 4 adapted to hold the nozzle 3 and a control unit 5. The nozzle 3 comprises a magnet means 6 and the nozzle boot 4 comprises a sensor means 7 which is adapted to detect the magnet means 6 of the nozzle 3. The magnet means 6 is placed below a handle in a front base portion of the nozzle 3 and the sensor means 7 is placed in a front bottom portion of the nozzle boot 4. Thus, the distance between the magnet means 6 and the sensor means 7 is kept to a minimum. The magnet means 6 and the sensor means 7 are also aligned vertically in the fuel dispensing unit 1. With this configuration the magnet means 6 will be easy to detect for the sensor means 7 when the nozzle 3 is held in the nozzle boot 4. The sensor means 7 is connected to the control unit 5 which in turn is connected to a pump 8 of the fuel dispensing unit 1. This way, the control unit 5 will be able to control the pump 8 of the fuel dispensing unit 1 and shift the fuel dispensing unit between a pumping state and a non-pumping state based on information received from the sensor means 7 of the nozzle boot 4. The fuel dispensing unit 1 can be configured in many different ways in order to prevent manipulation of the fuel dispensing unit 1. Especially, by varying the components included in the magnet means 6 and sensor means 7 and their configuration, the fuel dispensing unit 1can be made highly sophisticated. Some of the further possible embodiments will be discussed below.

[0020] Fig. 3 illustrates the nozzle 3 and the nozzle boot 4 of the fuel dispensing unit 1 according to a second embodiment of the invention. In this second exemplary embodiment of the invention the magnet means 6 of the nozzle 3 comprises a first magnet element 11 and a second magnet element 12, and the sensor means 7 of the nozzle boot 4 comprises a sensor element 13. The sensor element 13 of the nozzle boot 4 is adapted to detect the first and second magnet element 11, 12 of the nozzle 3. The first and second magnet elements 11, 12 are placed in the front base portion of the nozzle 3 and the sensor element 13 is placed in the front bottom portion of the nozzle boot 4. When the nozzle 3 is held in the nozzle boot 4 the first magnet element 11 is vertically aligned with the sensor element 13 and the second magnet element 12 is placed below the first magnet element 11 (in a vertical direction). With this configuration only the first magnet element 11 will be in connection with the sensor element 13 when the nozzle 3 is in an idle position. The sensor element 13 is connected to the control unit 5 which in turn is connected to the pump 8 of the fuel dispensing unit 1. When the nozzle 3 is in an idle position in the nozzle boot 4 the sensor element 13 of the nozzle boot 4 is only in connection with the first magnet element 11 of the nozzle 3. In one possible configuration of this embodiment, the pump 8 is started when the nozzle 3 is removed from the nozzle boot 4 and the control unit 5 receives information from the sensor element 13 of the nozzle boot 4 that the connection with the first magnet element 11 of the nozzle 3 has been lost, and that the second magnet element 12 was detected (the second magnet element 12 will pass the sensor element 13 when the nozzle 3 is lifted from its idle position) within a predetermined time period after the connection with the first magnet element 11 was lost. When the refueling has been completed the nozzle 3 is returned to the nozzle boot 4. The control unit 5 will then receive information from the sensor element 13 that the second magnet element 12 has been detected (the second magnet element 12 will pass the sensor element 13 when the nozzle 3 is returned to its idle position) and that connection between the first magnet element 11 of the nozzle 3 and the sensor element 13 of the nozzle boot 4 has been restored. If the control unit 5 receives information from the sensor element 13 that the second magnet element 12 has been detected and the connection with the first magnet element 11 has been restored, within a predetermined time period, the pump 8 of the fuel dispensing unit 1 will be turned off by the control unit 5. If, however, a deviation from the preset information presented above is detected by the control unit 5 based on the information received from the sensor element 13 the fuel dispensing unit 1 will be placed in an alarm state. The deviation may, for example, consist in that only one of the first and second magnet elements 11, 12 has been detected by the

sensor element 13 within a predetermined time period. Another possibility is that the first and second magnet elements 11, 12 have been detected by the sensor element 13 in an incorrect order. Such deviations may be caused by tampering of the fuel dispensing unit.

[0021] In Fig. 4, the nozzle 3 and the nozzle boot 4 of the fuel dispensing unit 1 according to an exemplary third embodiment of the invention is illustrated. In this third exemplary embodiment of the invention the magnet means 6 of the nozzle 3 comprises a magnet element 14, and the sensor means 7 of the nozzle boot 4 comprises a first sensor element 15 and a second sensor element 16. The first and second sensor elements 15, 16 of the nozzle boot 4 are adapted to detect the magnet element 14 of the nozzle 3. The magnet element 14 is placed in the front portion base of the nozzle 3 and the first and second sensor elements 15, 16 are placed in the front bottom portion of the nozzle boot 4. When the nozzle 3 is held in the nozzle boot 4 the magnet element 14 is vertically aligned with the second sensor element 16 which is placed below the first sensor element 15 (in a vertical direction) in the nozzle boot 4. With this configuration the magnet element 14 will only be in connection with the second sensor element 16 when the nozzle 3 is in an idle position. The first and second sensor elements 15, 16 are connected to the control unit 5 which in turn is connected to the pump 8 of the fuel dispensing unit 1. When the nozzle 3 is in an idle position in the nozzle boot 4, the magnet element 14 of the nozzle 3 is only in connection with the second sensor element 16 of the nozzle boot 4. In one possible configuration of this embodiment, the pump 8 is started when the nozzle 3 is removed from the nozzle boot 4 and the control unit 5 receives information from the second sensor element 16 of the nozzle boot 4 that the connection with the magnet element 14 of the nozzle 3 has been lost, and information from the first sensor element 15 that the magnet element 14 was detected (the magnet element 14 will pass the first sensor element 15 when the nozzle 3 is lifted from its idle position) within a predetermined time period after the connection with the second sensor element 16 was lost. When the refueling has been completed, the nozzle 3 is returned to the nozzle boot 4. The control unit 5 will then receive information from the first sensor element 15 that the magnet element 14 has been detected (the magnet element 14 will pass the first sensor element 15 when the nozzle 3 is returned to its idle position) and information from the second sensor element 16 that connection between the magnet element 14 and the second sensor element 16 has been restored. If the control unit 5 receives information from the first sensor element 15 that the magnet element 14 has been detected, and information from the second sensor element 16 that the connection with the magnet element 14 has been restored, within a predetermined time period, the pump 8 of the fuel dispensing unit 1 will be turned off by the control unit 5. If, however, a deviation from the preset information presented above is detected by the control unit 5 based on the information received from the first and second sensor elements 15, 16 the fuel dispensing unit 1 will be placed in an alarm state. The deviation may, for example, consist in that only one of the first and second sensor elements 15, 16 has detected said magnet element 14 within a predetermined time period. Another possibility is that the first and second sensor elements 15, 16 detect that the orientation of the magnet element 14 is incorrect. Such deviations may be caused by tampering of the fuel dispensing unit.

[0022] Fig. 5 illustrates the nozzle 3 and the nozzle boot 4 of the fuel dispensing unit 1 according to a fourth embodiment of the invention. In this fourth exemplary embodiment of the invention the magnet means 6 of the nozzle 3 comprises a first magnet element 17 and a second magnet element 18, and the sensor means 7 of the nozzle boot 4 comprises a first sensor element 19 and a second sensor element 20. The first sensor element 19 of the nozzle boot 4 is adapted to detect the first and second magnet elements 17, 18 of the nozzle 3. The second sensor element 20 is adapted to detect the second magnet element 18 of the nozzle 3. The first and second magnet elements 17, 18 are placed in the front base portion of the nozzle 3 and the first and second sensor elements 19, 20 are placed in the front bottom portion of the nozzle boot 4. When the nozzle 3 is held in the nozzle boot 4 the first magnet element 17 is vertically aligned with first the sensor element 19 and the second magnet element 18 is vertically aligned with the second sensor element 20. The first magnet element 17 is placed above the second magnet element 18 (in a vertical direction) in the nozzle 3, and the first sensor element 19 is placed above the second sensor element 20 (in a vertical direction) in the nozzle boot 4. With this configuration the first magnet element 17 will be in connections with the first sensor element 19 and the second magnet element 18 will be in connection with the second sensor element 20 when the nozzle 3 is in an idle position. The first and second sensor elements 19, 20 are connected to the control unit 5 which in turn is connected to the pump 8 of the fuel dispensing unit 1. When the nozzle 3 is in an idle position in the nozzle boot 4, the first magnet element 17 of the nozzle 3 is in connection with the first sensor element 19 of the nozzle boot 4, and the second magnet element 18 of the nozzle 3 is in connection with the second sensor element 20 of the nozzle boot 4. In one possible configuration of this embodiment, the pump 8 is started when the nozzle 3 is removed from the nozzle boot 4 and the control unit 5 receives information from the second sensor element 20 of the nozzle boot 4 that the connection with the second magnet element 18 of the nozzle 3 has been lost, and information from the first sensor element 19 that connection with the first magnet element 17 has been lost and that the second magnet element 18 was detected (the second magnet element 18 will pass the first sensor element 19 when the nozzle 3 is lifted from its idle position) within a predetermined time period after the connection with the first magnet el-

ement 17 was lost. When the refueling has been completed, the nozzle 3 is returned to the nozzle boot 4. The control unit 5 will then receive information from the first sensor element 19 that the second magnet element 18 has been detected (the second magnet element 18 will pass the first sensor element 19 when the nozzle 3 is returned to its idle position) and that connection between the first sensor element 19 nozzle boot 4 and the first magnet element 17 of the nozzle 3 has been restored, and information from the second sensor element 20 that the connection between the second sensor element 20 of the nozzle boot 4 and the second magnet element 18 of the nozzle 3 has been restored. If the control unit 5 receives information from the first sensor element 19 that the second magnet element 18 has been detected and that the connection with the first magnet element 17 has been restored, and from the second sensor element 20 that the connection with the second magnet element 18 has been restored, within a predetermined time period, the pump 8 of the fuel dispensing unit 1 will be turned off by the control unit 5. If, however, a deviation from the preset information presented above is detected by the control unit 5 based on the information received from the first and second sensor elements 19, 20 the fuel dispensing unit 1 will be placed in an alarm state. The deviation may, for example, consist in that only one of the first and second magnet elements 17, 18 has been detected by the sensor elements 19, 20 within a predetermined time period. Another possibility is that the first and second magnet elements 17, 18 have been detected by the sensor elements 19, 20 in an incorrect order. Such deviations may be caused by tampering of the fuel dispensing unit.

[0023] In Fig. 6, the nozzle 3 and the nozzle boot 4 of the fuel dispensing unit 1 according to an exemplary fifth embodiment of the invention is illustrated. In this fifth exemplary embodiment of the invention the magnet means 6 of the nozzle 3 comprises a first magnet element 21, a second magnet element 22 and a third magnet element 23, and the sensor means comprises a sensor element 24. The sensor element 24 of the nozzle boot 4 is adapted to detect the first, second and third magnet elements 21, 22, 23 of the nozzle 3. The first, second and third magnet elements 21, 22, 23 are placed in the front base portion of the nozzle 3 and the sensor element 24 is placed in the front bottom portion of the nozzle boot 4. When the nozzle 3 is held in the nozzle boot 4 the first magnet element 21 is vertically aligned with the sensor element 24 and the second and third magnet elements 22, 23 are placed below the first magnet element 21 (in a vertical direction). With this configuration only the first magnet element 21 will be in connection with the sensor element 24 when the nozzle 3 is in an idle position. The sensor element 24 is connected to the control unit 5 which in turn is connected to the pump 8 of the fuel dispensing unit 1. When the nozzle 3 is in an idle position in the nozzle boot 4 the sensor element 24 of the nozzle boot 4 is only in connection with the first magnet element 21 of the nozzle 3. In one possible configuration of this embodiment, the pump 8 is started when the nozzle 3 is removed from the nozzle boot 4 and the control unit 5 receives information from the sensor element 24 of the nozzle boot 4 that the connection with the first magnet element 21 of the nozzle 3 has been lost, and that the second and third magnet elements 22, 23 has been detected (the second and third magnet elements 22, 23 will pass the sensor element 24 when the nozzle 3 is lifted from its idle position) within a predetermined time period after the connection with the first magnet element 21 was lost. When the refueling has been completed the nozzle 3 is returned to the nozzle boot 4. The control unit 5 will then receive information from the sensor element 24 that the second and third magnets element 22, 23 have been detected (the second and third magnet element 22, 23 will pass the sensor element 24 when the nozzle 3 is returned to its idle position) and that connection between the first magnet element 21 of the nozzle 3 and the sensor element 24 of the nozzle boot 4 has been restored. If the control unit 5 receives information from the sensor element 24 that the second and third magnet elements 22, 23 have been detected and the connection with the first magnet element 21 has been restored, within a predetermined time period, the pump 8 of the fuel dispensing unit 1 will be turned off by the control unit 5. If, however, a deviation from the preset information presented above is detected by the control unit 5 based on the information received from the sensor element 24 the fuel dispensing unit 1 will be placed in an alarm state. The deviation may, for example, consist in that only one or two of the first, second and third magnet elements 21, 22, 23 has been detected by the sensor element 24 within a predetermined time period. Another possibility is that the first, second and third magnet elements 21, 22, 23 have been detected by the sensor element 24 in an incorrect order. Such deviations may be caused by tampering of the fuel dispensing unit.

[0024] The alarm state may, for example, comprise shifting the fuel dispensing unit to a non-pumping state, and optionally at least one of sounding an alarm, preventing a shift to pumping state and sending an alarm message.

[0025] Any one of the embodiments of the invention may also be applied without the use of a predetermined time period, i.e. by merely detecting the magnet means by means of the sensor means independently of time.

[0026] Also, other types of configurations of the control unit are naturally possible as long as the shifting of the fuel dispensing unit between a pumping state and a non-pumping state and the placing of the fuel dispensing unit in the alarm state is based on information received from the sensor means. Basically, the information received from the control unit may be used in any suitable way to effectively detect manipulation of the fuel dispensing unit.

[0027] The skilled person realizes that a number of modifications of the embodiments described herein are possible without departing from the scope of the invention, which is defined in the appended claims.

[0028] For instance, the sensor means may comprise different types of special sensors, such as for example Hall effect sensors, which will be able to make the fuel dispensing unit even more intelligent and sophisticated. The same applies for the magnet means. The control unit may be programmed to determine different types of parameters, such as, for example, a distance between two magnet elements, certain positions of the magnet elements in the nozzle or a time elapsed between detecting a first and a second magnet element based on the information given by the sensor means. If these parameters, during use of the fuel dispensing unit, do not correspond to the preset parameters the control unit will place the fuel dispensing unit in an alarm state in the same way as for the earlier described embodiments of the invention.

[0029] In one embodiment, the sensor means of the nozzle boot is able to detect if the poles of the magnets are correctly placed in the nozzle. The information is in turn used to shift the fuel dispensing unit between the pumping state and the non-pumping state.

[0030] As stated above, the magnet means may be constituted by one or a plurality of magnet elements of any suitable size and shape. The magnet elements may for example be square, rectangular or circular. The same applies for the sensor means and its sensor elements.

[0031] Magnet elements having a plurality of poles may be used, such as, for example a circular magnet element divided into a plurality of sections each one provided with a different pole. With such a configuration it is possible for the sensor element to detect pole shifts of the magnet element.

[0032] The placement of the magnet elements in the nozzle as well as the placement of the sensor elements in the nozzle boot may also be varied. However, it is preferred that a magnet element which is to be detected by a sensor element, when the nozzle is in an idle position in the nozzle boot, is vertically aligned with said sensor element in order to easily achieve a reliable connection between the elements.

[0033] The magnet elements may be attached to the nozzle in any suitable way. For example the magnet elements may be adhered, screwed or bolted to the nozzle. Another possibility is to enclose the magnet elements in a housing within the nozzle during the manufacturing process of the same. The same applies for the sensor elements and the nozzle boot.

[0034] The control unit may comprise a computer processor coupled with a computer readable storage medium. The storage medium may store computer-readable instructions that when executed by the processor, cause the processor to perform one or more of the functions described and/or shown herein.

Claims

1. A fuel dispensing unit (1) for refueling a vehicle, comprising
a nozzle (3) for dispensing fuel, said nozzle (3) comprising a magnet means (6),
a nozzle boot (4) adapted to hold said nozzle (3), said nozzle boot (4) comprising a sensor means (7) adapted to detect said magnet means (6), and
a control unit (5) connected to said sensor means (7) and adapted to receive information from said sensor means (7),
characterized in that said control unit (5) is adapted to shift said fuel dispensing unit (1) between a pumping state and a non-pumping state based on said information from said sensor means (7).

2. A fuel dispensing unit (1) according to claim 1, wherein said control unit is adapted to place said fuel dispensing unit (1) in an alarm state if said information does not correspond to a preset information.

3. A fuel dispensing unit (1) according to claim 2, wherein said alarm state comprises shifting said fuel dispensing unit (1) to a non-pumping state, and optionally at least one of sounding an alarm, preventing a shift to pumping state and sending an alarm message.

4. A fuel dispensing unit (1) according to claim 1, wherein said magnet means (6) comprises a first and a second magnet element (11, 12) and said sensor means (7) comprises a sensor element (13), said sensor element (13) being adapted to detect said first and second magnet elements (11, 12) and said control unit (5) being adapted to receive information from said sensor element (13).

5. A fuel dispensing unit (1) according to claim 4, wherein said control unit (5) is adapted to place said fuel dispensing unit (1) in an alarm state when receiving information from said sensor element (13) stating that only one of said first and second magnet elements (11, 12) has been detected by the sensor element (13) within a predetermined time period.

6. A fuel dispensing unit (1) according to claim 1, wherein said magnet means (6) comprises a magnet element (14) and said sensor means (7) comprises a first and a second sensor element (15, 16), said first and second sensor elements (15, 16) being adapted to detect said magnet element (14) and said control unit (5) being adapted to receive information from said first and second sensor elements (15, 16).

7. A fuel dispensing unit (1) according to claim 6, wherein said control unit (5) is adapted to place said fuel dispensing unit (1) in an alarm state when receiving information from said first and second sensor elements (15, 16), stating that that only one of said sensor elements (15, 16) has detected said magnet element (14) within a predetermined time period.

8. A fuel dispensing unit (1) according to claim 1, wherein said magnet means (6) comprises a first and a second magnet element (17, 18) and said sensor means (7) comprises a first and a second sensor element (19, 20), said first sensor element (19) being adapted to detect said first magnet element (17), said second sensor (20) element being adapted to detect said second magnet element (18), and said control unit (5) being adapted to receive information from said first and second sensor elements (19, 20).

9. A fuel dispensing unit (1) according to claim 8, wherein said control unit (5) is adapted to place said fuel dispensing unit (1) in an alarm state when receiving information from said first and second sensor elements (19, 20) stating that only one of said first magnet element (17) and second magnet element (18) has been detected by the sensor elements (19, 20) within a predetermined time period.

10. A fuel dispensing unit (1) according to claim 1, wherein said magnet means (6) comprises a first, a second and a third magnet element (21, 22, 23) and said sensor means (7) comprises a sensor element (24), said sensor element (24) being adapted to detect said first, second and third magnet elements (21, 22, 23) and said control unit (5) being adapted to receive information from said sensor element (24).

11. A fuel dispensing unit (1) according to claim 10, wherein said control unit (5) is adapted to place said fuel dispensing unit (1) in an alarm state when receiving information from said sensor element (24) stating that only one or two of said first, second and third magnet elements (21, 22, 23) has been detected by the sensor element (24) within a predetermined time period.

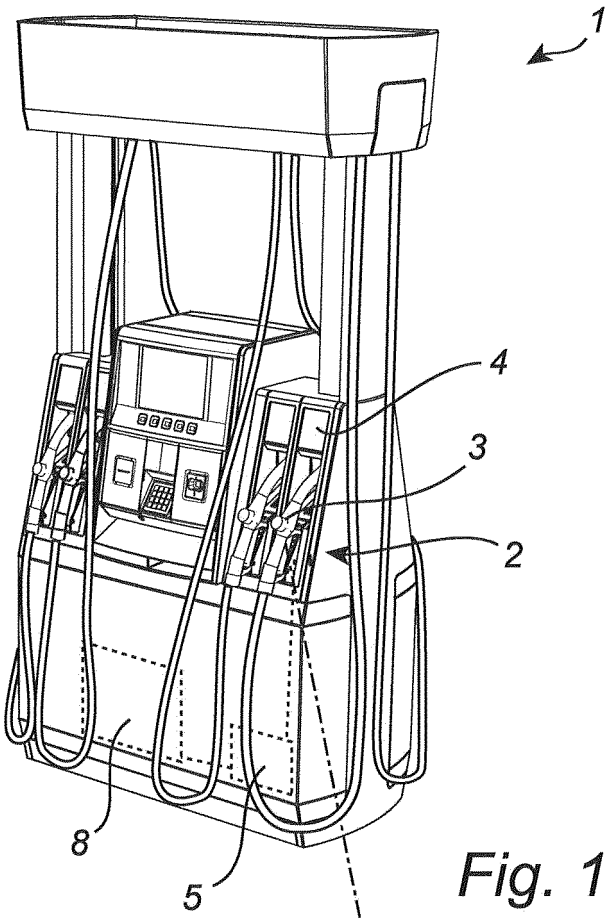


Fig. 1

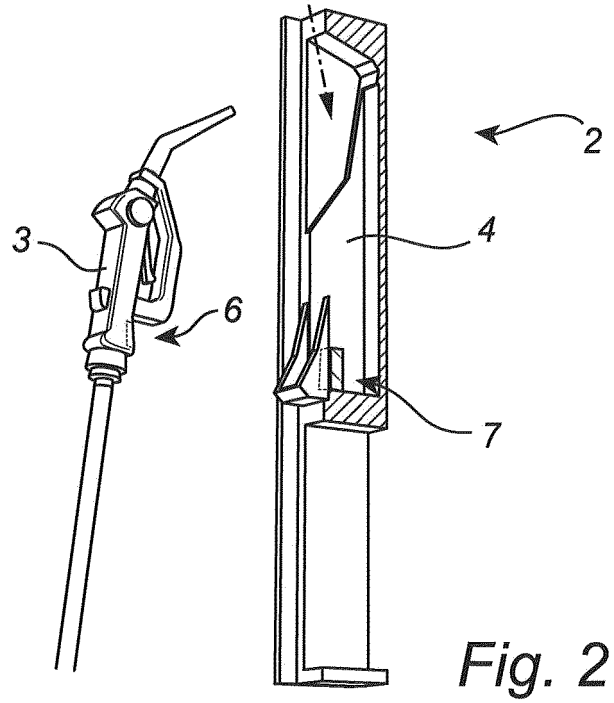


Fig. 2

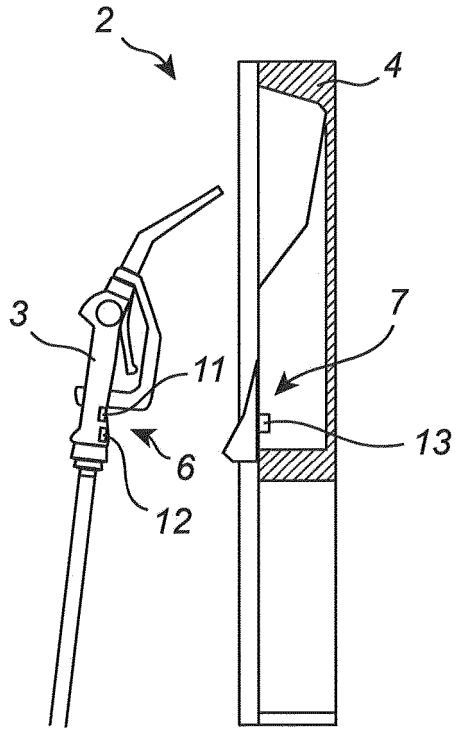


Fig. 3

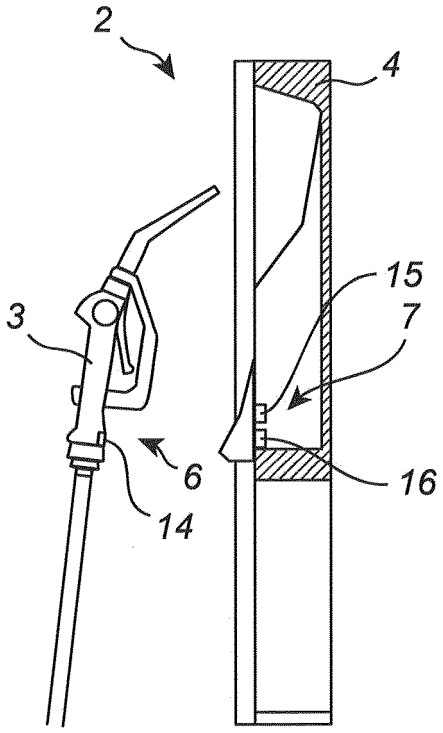


Fig. 4

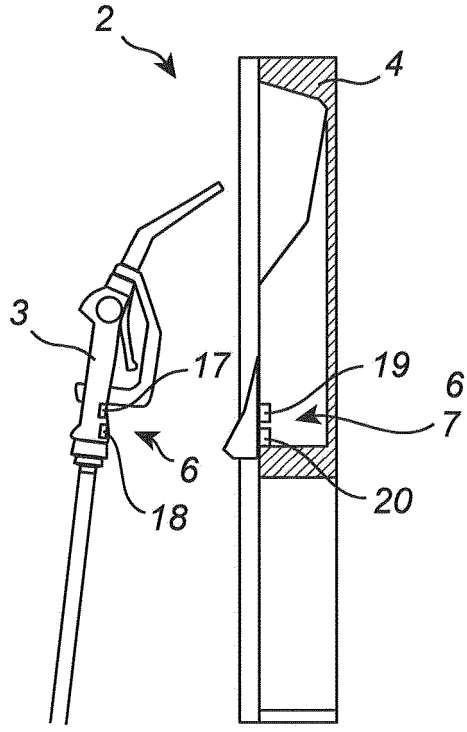


Fig. 5

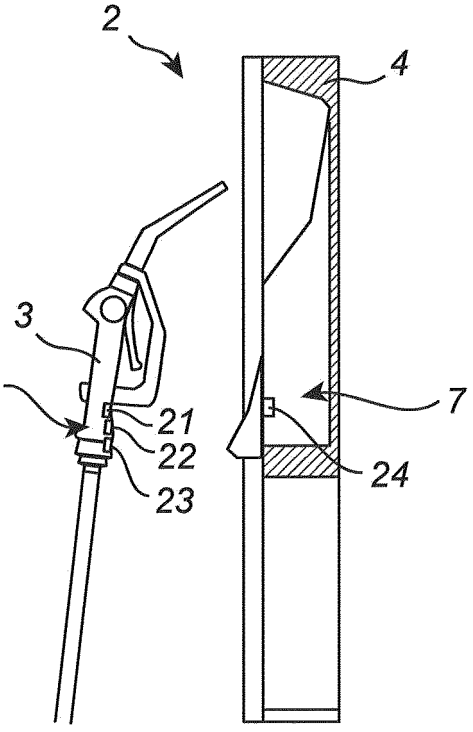


Fig. 6

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 13 15 9553

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	EP 1 995 210 A1 (DRESSER WAYNE AB [SE]) 26 November 2008 (2008-11-26) * paragraph [0040] * * paragraph [0046] *	1-11	INV. B67D7/34 B67D7/42 B67D7/84
Y	US 6 067 476 A (SILER BENJAMIN T [US]) 23 May 2000 (2000-05-23) * abstract; figure 6 *	1-3	
Y	DE 87 16 413 U1 (ALFONS HAAR, MASCHINENBAU GMBH & CO KG) 10 March 1988 (1988-03-10) * page 4, paragraph 2 - page 6, paragraph 1; figure 2 *	4-11	
A	US 2004/011421 A1 (BARTLETT JACK F [US] ET AL) 22 January 2004 (2004-01-22) * paragraph [0021]; figure 1 *	4,6,8,10	

TECHNICAL FIELDS SEARCHED (IPC)
B67D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	2 July 2013	Ferrien, Yann

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 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 13 15 9553

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

02-07-2013

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1995210 A1	26-11-2008	DK 1995210 T3	18-03-2013
		EP 1995210 A1	26-11-2008
		ES 2401193 T3	17-04-2013
		US 2008290152 A1	27-11-2008
US 6067476 A	23-05-2000	NONE	
DE 8716413 U1	10-03-1988	NONE	
US 2004011421 A1	22-01-2004	NONE	

EPO FORM P0459

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