A FUELING DISPENSER AND METHOD THEREFOR

(57) Abstract: In one aspect the present invention is directed to a fueling dispenser comprising: a lid disposed substantially at the outlet of the nozzle, a normally-close element, for normally closing the lid, inhibiting fuel spill out to the environment; and a lid opener, for opening the lid against the normally close element, upon insertion of the fueling dispenser into a refueling port, to allow fuel spill out, thereby retaining excess fuel upon the fueling dispenser removal from the refueling port, for the next insertion thereof into the or into another refueling port, thereby preventing the excess fuel spill out to the environment.

FIG 2
A FUELING DISPENSER AND METHOD THEREFOR

Field of the Invention

The present invention relates generally to handling/dispensing fuel. More specifically, embodiments of the present invention relate to a refueling fuel-saving apparatus and method.

Background of the Invention

The following terms used in the specification and in the claims, which follow hereinbelow, are defined-

The term "fuel" is intended to mean a liquid such as but not limited to gasoline, kerosene, and diesel fuel - all of which are typically used to power vehicles, boats, aircraft, and to heat homes, *inter alia*.

The term "refueling" is intended to mean the periodic process of supplying additional fuel when necessary. One exemplary meaning/use of the term "refueling" is when an automobile is refueled at a service station;

The term "refueling port" is intended to mean the tube/pipe/opening accessible in a vehicle, boat, aircraft, and home, *inter alia* through which refueling takes place.
Typically, in vehicles such as automobiles, the refueling port is located near the rear and at the side of the automobile;

The terms "nozzle" or "fuel nozzle" is intended to mean a tubular part of the fuel dispenser, which is used for refueling, for example, in gas stations. The nozzle is typically inserted into the refueling port in order to perform refueling. An exemplary nozzle is shown hereinbelow in the Figures; and

The term "excess fuel" is intended to mean the unintended, residual amount of fuel typically present at the nozzle following refueling.

Fig. 1 is a perspective view of a prior art fuel dispenser.

Upon refueling automobile 30 and removing dispenser 10 from a refueling port 14 drops of excess fuel 16 spill out of fuel nozzle 18.

Typically, when refueling of vehicle 30 is completed and when nozzle 18 is removed from refueling port 14, excess fuel 16 typically drips onto the ground, onto the vehicle, and even onto the clothes of the person performing the refueling, or, generally to the environment.

The arrow above nozzle 18 indicates the nozzle is being removed from the refueling port. Excess fuel has a cost and it is of course unfortunate to waste fuel. Additionally, excess fuel can evaporate at the environment causing flammability risk. In general, excess fuel can cause environmental and ecologic damages.
It would therefore be advantageous to avoid or solve the problems noted above related to excess fuel following refueling.

Other advantages and objects of the invention will become apparent as the description proceeds.

Summary of the Invention

In one aspect the present invention is directed to a fueling dispenser (10) comprising:
- a lid (26) disposed substantially at the outlet (ll) of the nozzle (18) of the fueling dispenser (10);
- a normally-close element (32), for normally closing the lid (26), inhibiting fuel spill out to the environment; and
- a lid opener (24), for opening the lid (26) against the normally-close element (32), upon insertion of the fueling dispenser (10) into a refueling port (14), to allow fuel spill out, the normally-close element (32) being tangible or an inherent non-tangible element,

thereby retaining excess fuel (16) upon the fueling dispenser (10) removal from the refueling port (14), for the next insertion thereof into the or into another refueling port (14), thereby preventing the excess fuel (16) spill out to the environment.

The disposition of the lid (26) substantially at the outlet (11) of the nozzle (18) of the fueling dispenser (10) may comprise (Figs. 3, 8) disposition of the lid (26) attached to close the outlet (11), upon the closing of the lid (26),
thereby the excess fuel (16) retaining may comprise retaining within the nozzle (18).

According to another embodiment the fueling dispenser (10) may further comprise (Fig. 7):
- a container (21) disposed at the outlet (II) of the nozzle, wherein the lid (26) is a lid (26) of the container (21), thereby the retaining the excess fuel (16) may comprise retaining the excess fuel (16) within the container (21).

The normally-close element (32) may comprise (Figs. 3, 8) a springy element (32) for normally closing the lid (26).

According to another embodiment the normally-close element (32) may comprise a magnetic element for normally closing the lid (26).

The lid (26) may be pivotally (pivot 34 - Fig. 8)) connected to the nozzle (18).

The lid (26) may be movable along the nozzle (18), being opened by (Fig. 4) riding above the nozzle (18), and being closed by being sent away (Fig. 3) from the nozzle (18), ceasing the riding.

The lid (26) further may comprise a springy element (36) for performing the sending away of the lid (26).
The lid opener (24) may comprise a surface having diameter greater than the diameter of the refueling port (14), thereby upon inserting the nozzle (18) into the refueling port (14), opening the lid (26).

The container (21) may be made substantially of, or coated by a material selected from one or more members of a group including neoprene, silicone, rubber.

The lid opener (24) may be substantially conic, for being used as a funnel directing excess fuel into the nozzle (18).

The fueling dispenser (10) may further comprise a wrapper (20) wrapping the nozzle (18), the wrapper comprising the lid (26), the normally-close element (32), and the lid opener (24).

The wrapper (20) may be attachable at one end thereof to the nozzle (18).

In another aspect the present invention is directed to a method for dispensing fuel, the method comprising the steps of:

- installing a normally-closed lid (26) on a nozzle (18) of a fuel dispenser (12);
- upon inserting the nozzle (18) into a refueling port (14) opening the lid (26) for allowing fuel dispensing; and
Upon removing the nozzle (18) from the refueling port (14), normally closing the lid (26), for retaining excess fuel (16), thereby preventing the excess fuel (16) spill out to the environment.

The method may further comprise the steps of:
- inserting the nozzle (18) into a refueling port (14) opening the lid (26), allowing the excess fuel (16) spill out into the refueling port (14).

The reference numbers have been used to point on elements in the embodiments described and illustrated herein, in order to facilitate the understanding of the invention. They are meant to be merely illustrative, and not limiting. Also, the foregoing embodiments of the invention have been described and illustrated in conjunction with systems and methods thereof, which are meant to be merely illustrative, and not limiting.

**Brief Description of the Drawings**

The invention is herein described, by way of example only, with reference to the accompanying drawings, wherein:

Fig. 1 is a perspective view of a prior art fuel dispenser. Upon refueling automobile 30 and removing dispenser 10 from a refueling port 14 drops of excess fuel 16 spill out of fuel nozzle 18.
Figs. 2, 3 and 4 are side and sectional side views of the fueling dispenser according to one embodiment of the present invention.

Figs. 5 and 6 are perspective views of Figs. 3 and 4, with wrapper 20 closed and open, respectively.

Fig. 7 depicts the wrapper of Fig. 3 according to another embodiment.

Fig. 8 depicts a lid of the fuel dispenser according to another embodiment at the normally closed state.

Fig. 9 depicts the lid of the fuel dispenser according to embodiment of Fig. 8 at the opened state.

It should be understood that the drawings are not necessarily drawn to scale.

**Detailed Description of Preferred Embodiments**

The present invention will be understood from the following detailed description of preferred embodiments, which are meant to be descriptive and not limiting. For the sake of brevity, some well-known features, methods, systems, procedures, components, circuits, and so on, are not described in detail.
Figs. 2, 3 and 4 are side and sectional side views of the fueling dispenser according to one embodiment of the present invention.

Fueling dispenser 10 comprises a wrapper 20 wrapping nozzle 18. Wrapper 20 may be attached coaxially to nozzle 18 by a band 22 or other means at one side thereof, avoiding shifting of that side.

Wrapper 20 is made of a substantially flexible material impervious to fuel, such as but not limited to, neoprene, silicone, rubber and so on. Neoprene, which is synthetic rubber, is a preferable option, as it tends to reject to fuels less than rubber.

The bellows shape of wrapper 20 is apparent in the referenced figures, and its flexible material provides a flexible (resilient, springy) structure.

At the normal state lid 26 is closed, inhibiting fuel spill out. Wrapper 20 includes a lid opener 24 thereof, which upon approaching refueling port 14 opens lid 26. The diameter of the lid opener 24 is larger than the diameter of the refueling port 14. Thus, upon inserting nozzle 18 into refueling port 14, refueling port 14 pushes lid opener 24 against the insertion direction, opening lid 26.

According to one embodiment lid opener 24 rigidly connected to lid 26. Lid 26 springily returns to the closed state.
thereof, as schematically depicted by a springy element 32 between lid opener 24 and wrapper 20. Thus lid 26 is normally closed, and may be opened by force on lid opener 24.

Springy element 32 need not be a tangible element; other mechanisms embodied by springy element 32 that open lid 26 upon applying force, and close the lid upon ceasing the force, may be used. Springy 32 is thus illustrated by dashed lines to indicate that this is an illustrative element.

Lid opener 24 may be conic, for being used as a funnel that directs excess fuel 16 into nozzle 18.

When nozzle 18 is outside refueling port 14, including not inserted thereinto or removed therefrom, lid 26 is closed, as in the states of Fig.s. 3 and 5, and the fuel cannot spill outside to the environment.

According to one embodiment at the closed state lid 26 seals nozzle 18.

According to the embodiment depicted by Figs. 4 and 6, upon inserting nozzle 18 into refueling port 14, flexible lid opener 24 is displaced by refueling port 14. A springy element 36 of wrapper 20 allows shrinking wrapper 20 to the state of Fig. 4, and allows lid 26 ride above the walls 40 of nozzle 18.

Upon removing nozzle 18 from refueling port 14, which is performed after the refueling is completed and the flow of
fuel from the nozzle ceases, the springy structure 36 of wrapper 20 returns lid 26 to cover outlet 11 of nozzle 18 to the normally closed state of Fig. 3.

According to one embodiment lid 26 seals outlet 11, as depicted by Fig. 3, avoiding excess fuel 16 from exiting nozzle 18.

The retained excess fuel is therefore not wasted and it can be available for the next refueling.

Figs. 5 and 6 are perspective views of Figs. 3 and 4, with wrapper 20 closed and open, respectively.

Fuel dispenser 10 except for saving the costs of the waste of the excess fuel itself, also reduces or eliminate the deleterious effects of spilled excess fuel, including safety and ecologic risk and damage.

Fig. 7 depicts the wrapper of Fig. 3 according to another embodiment.

According to the embodiment of Fig. 7, lid 26 may be sent away from outlet 11, thus wrapper 20 may function as a container 21 for fuel residing between band 22 and lid 26. Lid 26 need not close or seal outlet 11 of nozzle 18, but rather avoid excess fuel 16 from spilling to the environment by closing container 21.
Fig. 8 depicts a lid of the fuel dispenser according to another embodiment at the normally closed state.

According to the embodiment of Fig. 8 lid 26 is disposed at outlet 11 of nozzle 18, pivotally connected by pivot 34 inside nozzle 18, rather than outside. Lid 26 is normally closed magnetically or springily, for instance by a spring 32.

Fig. 9 depicts the lid of the fuel dispenser according to embodiment of Fig. 8 at the opened state.

Upon inserting nozzle 18 within refueling port 14, lid opener 24 opens lid 26 against spring 32, allowing fuel exit nozzle 18.

In the figures and/or description herein, the following reference numerals have been mentioned:

- numeral 10 denotes a fueling dispenser, according to one embodiment of the invention;
- numeral 11 denotes the end of nozzle 18.
- numeral 12 denotes a handle of a fueling dispenser;
- numeral 14 denotes the refueling port of the refueled automobile;
- numeral 15 denotes the edges of refueling port 14;
- numeral 16 denotes excess fuel;
- numeral 18 denotes the nozzle of fuel dispenser 10;
- numeral 20 denotes a wrapper around nozzle 18;
- numeral 21 denotes a fuel container including wrapper 20;
- numeral 22 denotes a band attaching one side of wrapper 20 to nozzle 18;
- numeral 24 denotes a lid opener;
- numeral 26 denotes a lid;
- numeral 30 denotes a vehicle, as an example of a device in which refueling port (14) is installed;
- numeral 32 denotes a springy element for closing the lid; the springy element may be a tangible element or an inherent non-tangible element of the fueling dispenser, indicating that the lid is closed at its default state;
- numeral 34 denotes a pivot;
- numeral 36 denotes a springy element for sending away the lid; and
- numeral 40 denotes the wall of the nozzle.

The foregoing description and illustrations of the embodiments of the invention has been presented for the purposes of illustration. It is not intended to be exhaustive or to limit the invention to the above description in any form.

The term of the claims that have been defined above, are to be interpreted according to that definition.

The reference numbers and figures in the claims are not a part of the claims, but rather used for facilitating the reading thereof. These reference numbers and reference figures should not be interpreted as limiting the claims in any form.
What is claimed is:

**CLAIMS**

1. A fueling dispenser (10) comprising:
   - a lid (26) disposed substantially at the outlet (II) of the nozzle (18) of said fueling dispenser (10);
   - a normally-close element (32), for normally closing said lid (26), inhibiting fuel spill out to the environment; and
   - a lid opener (24), for opening said lid (26) against said normally-close element (32), upon insertion of said fueling dispenser (10) into a refueling port (14), to allow fuel spill out, said normally-close element (32) being tangible or an inherent non-tangible element,

thereby retaining excess fuel (16) upon the fueling dispenser (10) removal from said refueling port (14), for the next insertion thereof into said or into another refueling port (14), thereby preventing said excess fuel (16) spill out to the environment.

2. A fueling dispenser (10) according to claim 1, wherein said disposition of said lid (26) substantially at the outlet (II) of the nozzle (18) of said fueling dispenser (10) comprises (Figs. 3, 8) disposition of said lid (26) attached to close said outlet (II), upon said closing of said lid (26), thereby said excess fuel (16) retaining comprises retaining within said said nozzle (18).
3. A fueling dispenser (10) according to claim 1, further comprising (Fig. 7):
   - a container (21) disposed at said outlet (ll) of said nozzle,
   wherein said lid (26) is a lid (26) of said container (21),
   thereby said retaining said excess fuel (16) comprises retaining said excess fuel (16) within said container (21).

4. A fueling dispenser (10) according to claim 1, wherein said normally-close element (32) comprises (Figs. 3, 8) a springy element (32) for normally closing said lid (26).

5. A fueling dispenser (10) according to claim 1, wherein said normally-close element (32) comprises a magnetic element for normally closing said lid (26).

6. A fueling dispenser (10) according to claim 1, wherein said lid (26) is pivotally (pivot 34 - Fig. 8) connected to said nozzle (18).

7. A fueling dispenser (10) according to claim 1, wherein said lid (26) is movable along said nozzle (18),
   being opened by (Fig. 4) riding above said nozzle (18), and
   being closed by being sent away (Fig. 3) from said nozzle (18), ceasing said riding.

8. A fueling dispenser (10) according to claim 1, wherein said lid (26) further comprises a springy element (36) for performing said sending away of said lid (26).
9. A fueling dispenser (10) according to claim 1, wherein said lid opener (24) comprises a surface having diameter greater than the diameter of said refueling port (14), thereby upon inserting said nozzle (18) into said refueling port (14), opening said lid (26).

10. A fueling dispenser (10) according to claim 1, wherein said container (21) is made substantially of, or coated by a material selected from one or more members of a group including neoprene, silicone, rubber.

11. A fueling dispenser (10) according to claim 1, wherein said lid opener (24) is substantially conic, for being used as a funnel directing excess fuel into said nozzle (18).

12. A fueling dispenser (10) according to claim 1, further comprising a wrapper (20) wrapping said nozzle (18), said wrapper comprising said lid (26), said normally-close element (32), and said lid opener (24).

13. A fueling dispenser (10) according to claim 12, wherein said wrapper (20) is attachable at one end thereof to said nozzle (18).

14. A method for dispensing fuel, said method comprising the steps of
- installing a normally-closed lid (26) on a nozzle (18) of a fuel dispenser (12);
- upon inserting said nozzle (18) into a refueling port (14) opening said lid (26) for allowing fuel dispensing; and

- upon removing said nozzle (18) from said refueling port (14), normally closing said lid (26), for retaining excess fuel (16),

thereby preventing said excess fuel (16) spill out to the environment.

15. A method according to claim 14, further comprising the steps of

- inserting said nozzle (18) into a refueling port (14) opening said lid (26), allowing said excess fuel (16) spill out into said refueling port (14).
### INTERNATIONAL SEARCH REPORT

**International application No.**

PCT/IL 10/00982

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(8) - B65B 3/04 (201.01)

USPC - 141/350; 220/86.2

According to International Patent Classification (IPC) or to both national classification and IPC.

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

USPC: 141/350; 220/86.2

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

USPC: All classes

Electronic database consulted during the international search (name of database and, where practicable, search terms used)

PubWEST (PGPB,USPT,EPAB,JPAB): Google, Google Patents

Keywords: fuel, gas, gasoline, diesel, nozzle, dispens$4, discharger$4, nozzle, lid, cover$4, cap, slit$4, retract$4, open$4, closer$4, ex tens$4, spring$4, bias$4, pivot$5, turn$4, shear, sleeve, cover$4, cone, conic, taper$4, neoprene, silicone, rubber, electrom

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

<table>
<thead>
<tr>
<th>Category*</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>US 4,907,630 A (Kulikowski et al.) 13 March 1990 (13.03.1990) col 4, In 25-43; col 5, In 43 to col 6, In 4; Fig. 5, 6</td>
<td>1-15</td>
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<td>Y</td>
<td>US 3,288,179 A (Romanowski et al.) 29 November 1966 (29.11.1966) col 2, In 60 to col 3, In 28; Fig. 2, 3</td>
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<td>Y</td>
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<td>Y</td>
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<td>5</td>
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<td>US 2002/0021017 A1 (Foltz) 21 February 2002 (21.02.2002) Fig. 8-11</td>
<td>6</td>
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Date of the actual completion of the international search: 21 March 2011 (21.03.2011)

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