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13/939,820 11 July 2013 (11.07.2013) US(71) Applicant: DRESSER INC. [US/US]; 15455 Dallas Park-
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Electric Company, Global Patent Operation, 2 Corporate
Drive, Suite 648, Shelton, CT 06484 (US).(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY,
BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM,DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,
HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR,
KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME,
MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ,
OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA,
SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM,
TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM,
ZW.(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ,
UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ,
TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK,
EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV,
MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,
TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
KM, ML, MR, NE, SN, TD, TG).**Declarations under Rule 4.17:**

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

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[Continued on next page]

(54) Title: DISPENSER FOR COMPRESSED NATURAL GAS (CNG) FILLING STATION

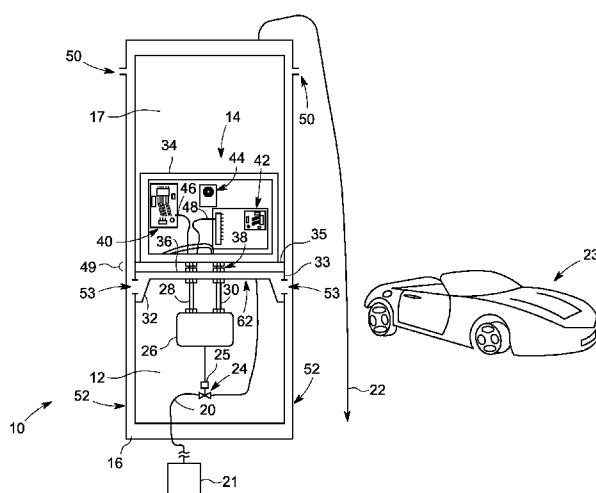


FIG. 2

(57) **Abstract:** A fueling station dispenser for distributing a combustible gas that is lighter than air, and that includes electrical and gas handling sections in the same frame. A vapor barrier in the cabinet blocks fugitive gas that may be present in the gas handling section from entering the electrical section. According to most applicable codes, by isolating combustible gas from the electrical section gives it a Class I, Division 2 designation. Which eliminates the need to seal or air purge the electronics section as this designation allows for electronics that under normal intended operating conditions do not generate an arc with sufficient energy to initiate combustion.



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- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

DISPENSER FOR COMPRESSED NATURAL GAS (CNG) FILLING STATION

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to and the benefit of co-pending U.S. Provisional Application Serial No. 61/725,366, filed November 12th, 2012, the full disclosure of which is hereby incorporated by reference herein for all purposes.

BACKGROUND OF THE INVENTION

Field of Invention

[0002] The present disclosure relates in general to a device and method for dispensing fuels lighter than air, such as compressed natural gas (CNG). More specifically, the present disclosure relates to a gas dispenser having gas handling components and electronics in the same structure, and where the electronics are mounted in a non-purged housing spaced away from the gas handling components.

Description of Prior Art

[0003] Traditionally, vehicles have been fueled by one or more distillates of fuel oil, such as gasoline or diesel. Since these fuels have vapors that are heavier than air, the dispensers for these fuels were designed with the electronics located above the fuel-handling, hazardous area. This allowed the dispenser structure to be broken into different hazardous area classifications allowing electronics to be located in the structure with minimal safeguards from the flammable vapors below. Recently, a growing number of vehicles have been manufactured, or converted, to operate on compressed natural gas (CNG), which is lighter than air, instead of the heavier than

air longer chain hydrocarbons. The availability, low cost, and lower emissions of combusting natural gas over fuel oil distillates have garnered interest in continuing to increase the number of natural gas powered vehicles. Similar to typical gasoline or diesel fueling dispensers, CNG fueling dispensers, whose structure contains piping and valves for delivering gas to a customer, have been designed using similar dispenser structures with the electronics, which control the dispenser and payment authorization terminals, above the gas handling components.

[0004] Standards for the safe handling of CNG have been published by national code recommending bodies. Many states have adopted these codes in their respective vehicle, transportation, and building regulations. As CNG is lighter than air, unlike gasoline or diesel vapors, CNG that may escape from the gas handling components can rise; and thus present different hazardous zones for a CNG dispenser as compared to a gasoline or diesel dispenser. As such, standards for CNG dispensers reflect a different hazardous zone rating as compared to gasoline or diesel dispensers in these standards. For example, explosive vapors may sometimes concentrate in spaces above a gas handling portion of a CNG dispenser having a traditional gasoline or diesel dispenser design. By most standards, the spaces normally having the explosive vapor concentration would be deemed Class I, Division 1, thus prohibiting any device capable of producing a spark. For example, applicable codes typically designate Class I locations to be where a flammable gas or vapor may be present in a sufficient amount to produce an explosion or ignitable mixture. Class I locations are sometimes designated as Division 1 when the flammable gas is likely to exist, such as in quantities sufficient to produce an explosive or ignitable mixture under normal operating conditions. Class I locations are sometimes designated as Division 2 when the flammable gas is not normally present in an explosive concentration, but accidentally exists. Some CNG dispensers having traditional gasoline or diesel dispenser

structures address this change in hazardous rating by enclosing electronics in an explosion-proof junction box, including an Intrinsic Safe Barrier (ISB), or disposing electronics in an air purged enclosure protected through pressurization. There are some components used in payments terminals that either due to the need of accessibility to the customer or because of the type of component, cannot be adequately protected by an explosion-proof junction box or an ISB. When this is true, these components are normally protected by an air purge system. Correctly implemented, an air purge system can change the area within the enclosure to a non-hazardous, or unclassified area. Air purge systems can be affected by ambient pressure variations and wind. An air purge system also exposes the electronics to cold and/or moist air that can affect the operation of the components as well as corrode or damage them. It can also inject dirt into the system. The fans used for the source of air for air purge systems must be positioned in a location away from the hazardous area that is created by the dispenser, which increases installation costs and complexity.

SUMMARY OF THE INVENTION

[0005] Disclosed herein are embodiments of a dispenser for handling a combustible gas. In one embodiment the dispenser includes a frame, an electrical section, and a gas handling section. Further included in the frame is a vapor barrier that blocks fugitive gas from entering into the electronics section. Example vapor barriers include a bulkhead in the gas handling section, a bulkhead in the electronics section, a housing for electronics in the electrical section, and combinations thereof. Without the rating whereby an explosive mixture of gas normally is in the electronics section, electronics can be deployed that do not create an arc during their normal operation with sufficient energy to initiate combustion. Also optionally included is a vent

system that includes side columns for venting fugitive gas from the gas handling section to ambient and that bypasses the electronics section.

BRIEF DESCRIPTION OF DRAWINGS

[0006] Some of the features and benefits of embodiments of the present invention having been stated, others will become apparent as the description proceeds when taken in conjunction with the accompanying drawings, in which:

[0007] FIG. 1 is a schematic example of a dispenser for compressed natural gas illustrating safety code classifications of surrounding zones and in accordance with the present disclosure;

[0008] FIG. 2 is a partial sectional view of the dispenser of Figure 1 in accordance with the present disclosure;

[0009] FIG. 3 is a perspective view of a partial cut-away view of an example of a portion of the dispenser of Figure 1 in accordance with the present disclosure; and

[0010] While the invention will be described in connection with the preferred embodiments, it will be understood that it is not intended to limit the invention to that embodiment. On the contrary, it is intended to cover all alternatives, modifications, and equivalents, as may be included within the spirit and scope of the invention as defined by the appended claims.

DETAILED DESCRIPTION

[0011] A method and system of the present disclosure will now be described more fully hereinafter with reference to the accompanying drawings in which embodiments are shown. Embodiments of the method and system of the present disclosure may be in many different forms and should not be construed as limited to the illustrated embodiments set forth herein;

rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey its scope to those skilled in the art. Like numbers refer to like elements throughout.

[0012] It is to be further understood that the scope of the present disclosure is not limited to the exact details of construction, operation, exact materials, or embodiments shown and described, as modifications and equivalents will be apparent to one skilled in the art. In the drawings and specification, there have been disclosed illustrative embodiments and, although specific terms are employed, they are used in a generic and descriptive sense only and not for the purpose of limitation.

[0013] Figure 1 schematically illustrates an example of a gas dispenser 10 in which a gas handling section 12 and electronics section 14 are housed in a frame 16. In the example of Figure 1, the CNG dispenser 10 may be located at a fueling station 11 that offers retail or wholesale purchase of CNG. Optionally, the fueling station 11 can be onsite at a facility where all fuel dispensed is for use at or associated with the facility. Examples include fleet fueling, farming operations, manufacturing locations, and processing facilities. As will be described in more detail below, the gas handling section 12 includes gas handling equipment for controlling a flow of gas from storage, through the dispenser 10, and to a container removeable from the fueling station 11. Also described in more detail below is that the electronics section 14 contains electrical hardware and software for monitoring and recording an amount of gas dispensed, and optionally for monitoring and processing payment of gas purchased. Further in the example of Figure 1, the electronics section 14 is disposed in a headspace portion 17 shown included within the frame 16. The headspace portion 17 does not extend into the gas handling section 12. As shown, the gas handling section 12 and the body of the frame 16 are in a Class I, Division I zone

or area per code. Example codes include those created by the National Fire Protection Association (such as NFPA 52), the National Electrical Code (such as NEC §§ 500), and provided by 29 CFR § 1910.307. Further illustrated is a zone 18 surrounding the dispenser 10, where most applicable codes designate the zone 18 and the headspace portion 17 (including the electronics section 14) as Class I, Division 2; meaning under normal operating conditions, combustible gas, or other flammable substance would not be present in sufficient quantity/concentration to introduce a risk of combustion. In some examples, zone 18 extends at least 5 feet from the outer periphery of the frame 16. Unlike the more restrictive Class I, Division 1 area, placing arc capable electronics in a Class I, Division 2 area does not violate code, if under normal or expected operating conditions the electronics do not produce an arc having sufficient energy to initiate combustion.

[0014] In one example, a vapor barrier between the gas handling section 12 and the electronics section 14 removes paths of fugitive gas flow between these sections 12 and 14. As such, electronics section 14 is not in a Class I, Division 1 zone as specified in the code. Instead the electronics section 14 is designated as a Class I, Division 2 zone per code. The less restrictive Class I, Division 2 zone definition expands the options of electronics that can be in electronics section 14. For example, absent isolating gas handling section 12, to comply with code, electronics in section 14 must be protected by an explosion-proof housing, and ISB circuit, or an air purge system. Instead, by isolating electronic section 14 in a separate housing whose structure is independent from the gas handling housing, code compliance for a Class I, Division 2 zone is achieved without the use of explosion-proof enclosures, an ISB or an air purge system.

[0015] Figure 2 illustrates a front cut away view of an example of the dispenser 10 of Figure 1. Here a supply line 20 is shown in the gas handling section 12 for transporting a flow of gas from

a gas supply 21 to a nozzle line 22 that attaches to an outer surface of the dispenser 10. Examples of the gas include compressed gas, compressed natural gas (CNG), any gas lighter than air, any combustible gas, any combustible gas lighter than air, and combinations thereof. In an example, the nozzle line 22 has an attachment at its free end for connection to a vehicle 23 for refueling the vehicle 23. Although the vehicle 23 is illustrated as an automobile, the dispenser 10 can supply any device or system that uses fuel to operate. Optionally, the nozzle line 22 can be used for filling a vessel in which CNG is stored. A valve 24 is further shown in Figure 2 for controlling the flow of fluid through line 20. The valve 24 is shown having an actuator 25 selectively driving the valve 24 to open and closed positions, and all positions between open and closed. Further illustrated is that the actuator 25 is in communication with a control box 26, which in an example is a sealed container having electrical connections for electrical leads in the gas handling section 12. Electrical conduits 28, 30 are shown that extend from the control box 26 and through a bulkhead 32 in the frame 16. In an example, the bulkhead 32 is generally sealed and forms a vapor barrier that blocks a free flow of fugitive gas. In one embodiment, the bulkhead 32 defines a border of the gas handling section 12. The outer periphery of the bulkhead 32 is positioned against an inner surface of the frame 16 to define an interface 33. Alternate examples of the gas handling section 12 include any embodiment for controlling, regulating, or otherwise managing a flow of gas through the frame 16.

[0016] A housing 34 is illustrated in the frame 16 in a space that is on a side of the bulkhead 32 opposite the gas handling section 12. In the example of Figure 2, the housing 34 is generally rectangular and mounts on a bulkhead 35 to “float” in the frame 16. Like bulkhead 32, bulkhead 35 defines a vapor barrier that blocks a free flow of fugitive gas, and whose structure may be the same or similar to bulkhead 32. As shown, the outer periphery of the housing 34 is set inward

from the inner surface of the frame 16, and spaced upward from the bulkhead 32. Alternate embodiments include mounting housing 34 directly to inner surface of frame 16. In an embodiment, housing 34 functions as a vapor barrier and blocks a free flow of non-pressurized fugitive gas. In this example, fugitive gas that may be present in the head space 17 is blocked by the housing 34 from becoming in contact with electronics in the housing 34. As such, by providing a vapor barrier between the gas handling section 12 and the electronics section 14, electronics capable of arcing, but that do not normally arc, can be put in the electronics section 14 without violating applicable codes. Examples exist wherein structure described herein functions as a vapor barrier, and yet is not air tight. Machined flat washers 36 are shown around the conduits 28, 30 where they pass through bores in bulkheads 32, 35. Fasteners 38 maintain the washers 36 in place and against the upper and lower surfaces of the bulkheads 32, 35 to form metal to metal seals. Example printed circuit boards 40, 42 are illustrated in the housing 34 as well as an example power supply 44. Conduits 28, 30 provide a protective housing for wires 46, 48 that connect to boards 40, 42 and that may be in communication with components disposed in the gas handling section 12. A polymer (not shown), or other flowable material, may be set inside conduits 28, 30 for protecting any wires or lines therein. Seals (not shown) may be included in the intersections between conduits 28, 30 for ensuring isolation between the electronics section 14 and frame 16 and gas handling section 12. In an alternate embodiment, conduits 28, 30 may mount on a lateral side of housing 34 and may optionally intersect a sidewall of gas handling section 12. An optional air gap 49 is shown formed between the upper surface of bulkhead 32 and lower surface of housing 34, and in which conduits 36, 38 are disposed.

[0017] In the example of Figure 2, boards 40, 42 are powered by power supply 44 and include circuitry and/or processors configured for card reading functions, or other functions for handling a transaction of CNG sales. Control of the valve 24 or safety functions may also be performed by hardware or software embedded in the boards 40, 42. Further, as the gas handling section 12 is isolated from the housing 34, the boards 40, 42 in the electronics section 14 can be designated for use in a Class I, Division 2 zone rather than the more stringent Class I, Division 1 zone. In one example, isolating the electronics section 14 in the housing 34 from the gas handling section 12 includes blocking any continuous flow paths between sections 12, 14. An advantage of disposing the electronics section 14 within the frame 16 and suspended proximate to the gas handling section 12 and optionally separated from it by gap 49 is that the dispenser 10 can maintain the appearance of a traditional dispenser while still complying with applicable regulations. An advantage of the present disclosure is that an air tight seal or housing is not required for the electronics in the electronics section 14 to achieve isolation.

[0018] Further illustrated in the example of Figure 2 are vents 50 formed through side columns 52 that extend along opposing lateral sides of the structure 10. Openings 53 are shown through a sidewall of frame 16 adjacent the gas handling section 12 that provide communication from inside gas handling section 12 into a vertically extending space in each side columns 52. In the example of Figure 2, fugitive gas from the gas handling components (e.g. valve 24, line 20, fittings, etc.) in the gas handling section 12 can flow from gas handling section 12, through the openings 53, and into the side columns 52. As bulkhead 32 is a vapor barrier, it prevents direct upward flow of the fugitive gas. The side columns 52 form an upward flow path for any of these fugitive gases that may leak from the gas handling section 12. The vents 50 provide communication from the side columns 52 to the space ambient to the structure 10 which is a

location remote from and above the electronics section 14. As such, the combination of the bulkhead 32, openings 53, side columns 52, and vents 50 further protect against fugitive gas from entering into the electronics housing 34.

[0019] Shown in a perspective partially exploded view in Figure 3, is an embodiment of the frame 16 where the side columns 52 include side walls 54, 55 that extend substantially the height of the frame 16 on opposing lateral sides. Elongate thin walled panels 56, 57 are respectively positioned over and set back from side walls 54, 55 to form the vertically extending space in each side column 52. In the example of Figure 3, vents 50 are louvered openings provided proximate the upper terminal ends of panels 56, 57 and openings 53 are in side walls 54, 55 (shown in dashed outline in side wall 55) below bulkhead 32. Rear wall 58 is on a rearward side of frame 16 and adjacent the gas handling section 12. Forward wall 59, shown partially cut-away, is on a forward side of the frame 16 and adjacent gas handling section 12. Referring back to Figure 2, bulkhead 32 is shown having a substantially planar mid-portion 62 oriented generally transverse to side walls 54, 55, 58, 59. The outer periphery of the bulkhead 32 angles perpendicular to mid-portion 62 to define side surfaces that contact respective side walls 54, 55, 58, 59 along interface 33. Thus the bulkhead 32 extends across opposing inner surfaces of the frame 16. Referring back to Figure 3, lateral side walls and a lower wall of the housing 34 are shown mounted in frame 16, with the lateral side walls set inward from side walls 54, 55 of cabinet 16 to form an air gap between housing 34 and frame 16. Further illustrated in Figure 3 are bores 74, 76 through the lower wall of the housing 34 receiving the conduits 28, 30 of Figure 2.

[0020] Embodiments of the present invention described herein, therefore, is well adapted to carry out the objects and attain the ends and advantages mentioned, as well as others inherent

therein. While a presently preferred embodiment of the invention has been given for purposes of disclosure, numerous changes exist in the details of procedures for accomplishing the desired results. For example, embodiments exist where compliance with applicable codes is maintained by providing a single vapor barrier (one or more of bulkheads 32, 35 or housing 34) between the gas handling and electronic sections 12, 14. These and other similar modifications will readily suggest themselves to those skilled in the art, and are intended to be encompassed within the spirit of the present invention disclosed herein and the scope of the appended claims.

CLAIMS

What is claimed is.

1. A dispenser for handling compressed gas comprising:

a frame;

a gas handling section in the frame;

an electronics section in the frame; and

a vapor barrier in the frame, so that when fugitive gas is in the gas handling section, the fugitive gas is blocked from flowing into the electronics section by the vapor barrier.
2. The dispenser of claim 1, wherein the vapor barrier comprises a bulkhead in the frame that defines an upper terminal end of the gas handling section.
3. The dispenser of claim 1, wherein the vapor barrier comprises a bulkhead disposed in the frame above the gas handling section.
4. The dispenser of claim 1, wherein the vapor barrier comprises a housing in the electronics section and in which electronics are disposed.
5. The dispenser of claim 2, further comprising an electrical conduit extending between the electronics section and the gas handling section and through the bulkhead.
6. The dispenser of claim 1, wherein the gas comprises compressed natural gas.
7. The dispenser of claim 1, further comprising side columns in the frame that extend adjacent the gas handling section and to above the electronics section, an opening in a sidewall

of the gas handling section, and a vent in a sidewall of each of the side columns, so that fugitive gas in the gas handling section can flow through the opening, along the side columns, and through the vents to outside of the frame and past the electronics section.

8. The dispenser of claim 1, wherein the gas handling section is defined as a Class I, Division 1 area, and the electronics section is defined as a Class I, Division 2 area.

9. A dispenser for use with a combustible gas comprising:

a frame;

a gas handling section in the frame in communication with a supply of combustible gas;

and

an electronics section in the frame in signal communication with the gas handling section;

a vapor barrier in the cabinet that defines an obstacle to a free flow of fugitive gas to within the electronics section; and

a vent system in which fugitive gas from the gas handling section selectively bypasses the electronics section.

10. The dispenser of claim 9, wherein the vapor barrier comprises a bulkhead mounted in the frame.

11. The dispenser of claim 10, wherein the bulkhead is in the gas handling section.

12. The dispenser of claim 10, wherein the bulkhead is in the electronics section.

13. The dispenser of claim 9, wherein the vapor barrier comprises a housing in the electronics section, and wherein electronics are disposed in the housing that only during unexpected conditions are the electronics capable of producing an arc having sufficient energy to initiate combustion.

14. The dispenser of claim 9, wherein the vent system comprises vertical open spaces housed in side columns on lateral sides of the frame, openings that extend through sidewalls of the gas handling section and that intersect with the vertical open spaces, and vents in the side columns on a side of the electronics section opposite the gas handling section, and that define a communication path between the vertical open spaces and ambient.

15. A dispenser for handling a combustible gas comprising:

a cabinet;

a gas handling section in the cabinet that comprises a line in communication with a source of combustible gas, and that is in selective communication with a nozzle outside of the cabinet;

an electronics section in the cabinet;

a first bulkhead in the gas handling section that defines a first vapor barrier;

a second bulkhead in the electronics section that defines a second vapor barrier; and

a housing in the electronics section having electrical hardware disposed therein and that defines a third vapor barrier.

16. The dispenser of claim 15, having electrical hardware that can produce an arc having sufficient energy to initiate a combustion only during unexpected operation.
17. The dispenser of claim 15, further comprising an air gap between the gas handling section and the housing and an air gap between side wall of the cabinet and the housing.
18. The dispenser of claim 15, wherein the gas is lighter than air.

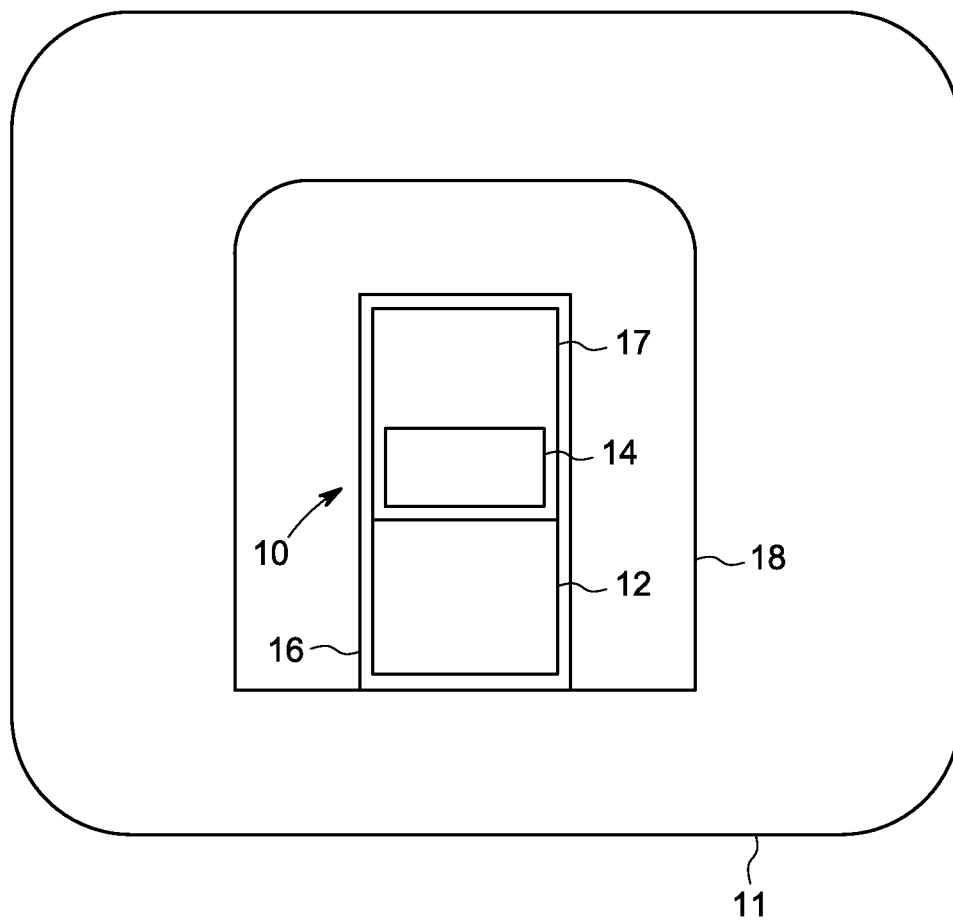


FIG. 1

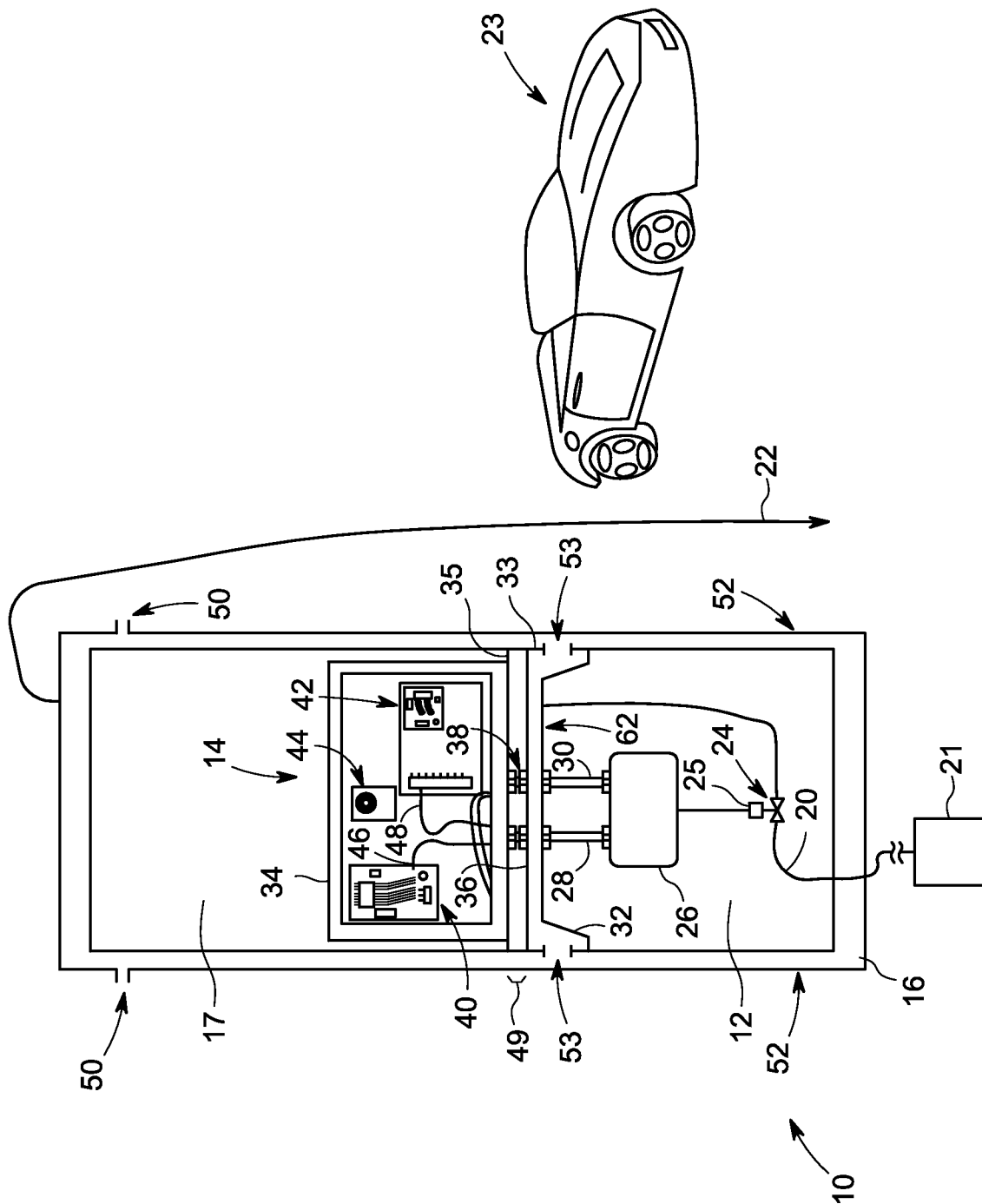


FIG. 2

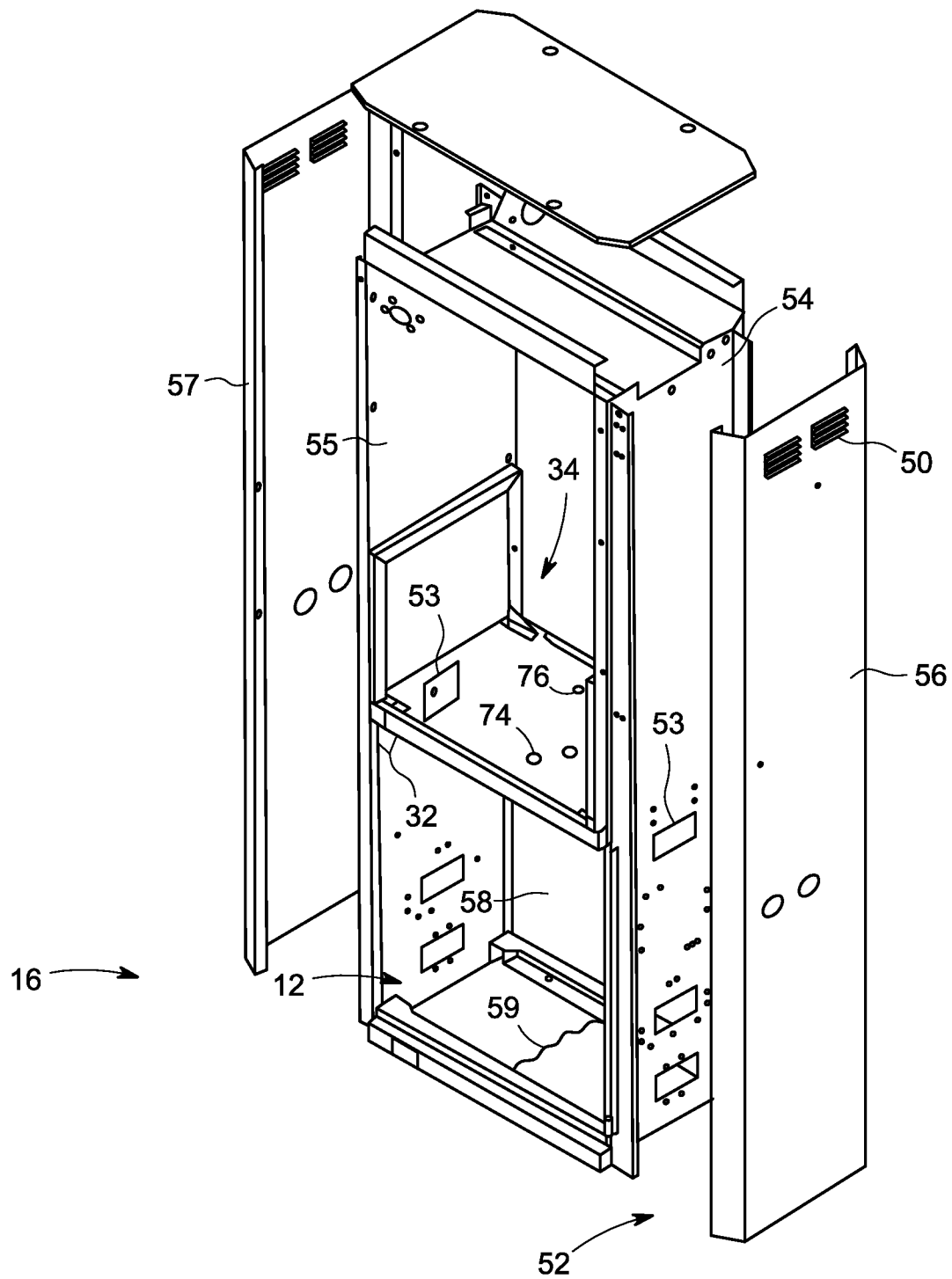


FIG. 3

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2013/069369

A. CLASSIFICATION OF SUBJECT MATTER
INV. F17C5/06
ADD.

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)
F17C

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

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

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 238 030 A (MILLER CHARLES E [US] ET AL) 24 August 1993 (1993-08-24) column 1, line 10 column 4, line 65 - column 5, line 31 column 10, lines 25-37 column 11, lines 14-35 -----	1-6, 8-13, 15-18
A	US 2003/164202 A1 (GRAHAM JOHN DAVID TREVOR [CA] ET AL) 4 September 2003 (2003-09-04) paragraphs [0024], [0029], [0030], [0033], [0040], [0053] - [0057] -----	1-18
A	EP 1 835 222 A1 (M & W ZANDER FE GMBH [DE]) 19 September 2007 (2007-09-19) paragraphs [0001] - [0005], [0010] - [0014] ----- -/-	1-18

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

27 March 2014

Date of mailing of the international search report

03/04/2014

Name and mailing address of the ISA/

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Authorized officer

Ott, Thomas

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2013/069369

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 569 151 A (KARWACKI EUGENE J [US] ET AL) 29 October 1996 (1996-10-29) column 2, line 64 - column 4, line 12 -----	1-18
A	US 5 964 659 A (HERTZLER BENJAMIN LEE [US] ET AL) 12 October 1999 (1999-10-12) column 3, line 40 - column 4, line 7 -----	1-18
A	DE 30 22 672 A1 (MUELLER & CO SCHWELMER EISEN [DE]) 24 December 1981 (1981-12-24) the whole document -----	1-18

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2013/069369

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☒ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-8

A dispenser with a frame, a gas and an electronic section
and a vapor barrier

2. claims: 9-14

A dispenser with a frame, a gas and an electronic section
and a vapor barrier and a vent system

3. claims: 15-18

A dispenser with a frame, a gas and an electronic section
and a vapor barrier and a housing

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2013/069369

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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