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INTERNATIONALE RESEARCH MAATSCHAPPIJ**

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(54) Title: DRIPLESS ADAPTER FOR A FUEL NOZZLE

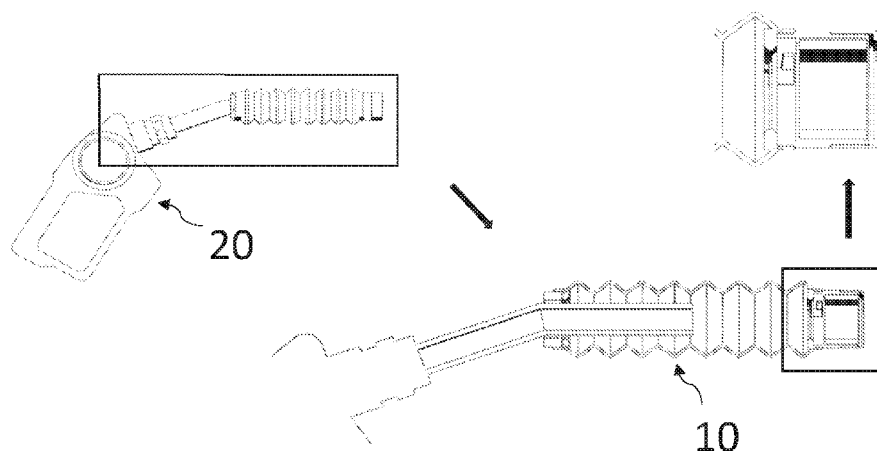


FIG. 1

(57) Abstract: A dripless nozzle adapter (10) which can be retrofitted onto existing fuel dispensing nozzles (20), as well as a fuel nozzle (20) having said dripless nozzle adapter (10). The dripless nozzle adapter (10) is comprising of: a) a dripped fuel collection and absorbent assembly (11); b) a flexible connection portion (12); and c) a connector (13), connecting said flexible connection portion (12) to the fuel nozzle (20). There is an absorbent component (40) within the adapter body (30) that absorbs the drips that are encapsulated by the nozzle (20). The absorbent materials can be rapidly disposed of and replaced by a technician without destruction of the adapter. Also, there is a seal portion (50) inside the dripped fuel collection and absorbent assembly (11), which deforms to allow easy traversal of the nozzle to allow normal fuelling to occur. The adapter (10) has a quick release for the seal, allowing for quick removal, inspection, or maintenance.

KR, KW, KZ, LA, LC, LK, LR, LS, 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,
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DRIPLESS ADAPTER FOR A FUEL NOZZLE

TECHNICAL FIELD

5 The present invention relates to a nozzle for dispensing fuel into a vehicle fuel tank. More particularly, the present invention relates to a dripless nozzle adapter for eliminating dripped fuel when dispensing fuel into a vehicle fuel tank.

BACKGROUND OF THE INVENTION

10 Environmental and/or safety concerns have dictated that nozzles of a fuel dispensing system be designed to prevent fuel from dripping from the spout of the nozzle after the nozzle is removed from the vehicle fuel tank and returned to the dispenser. Various nozzles and means have been proposed for reducing dripped fuel in a fuel dispensing system.

15 U.S. Pat. Nos. 5,620,032; 5,377,729; and patent application WO 2004106219 disclose various valves designed to prevent fuel from dripping from the spout once it is removed from a fuel tank. These designs do not prevent drips that occur from fuel that escapes from the check valve prior to full closure, or due to small gaps within the check valve.

20 Further, U.S. Pat. Nos. 6,983,772; 7,748,419; 9,156,045; 6,772,804; 6,311,742; 6,854,491; 6,520,222; and US patent application Nos. 20040060612 disclose various structures built into fuel nozzles to prevent fuel from dripping from the spout once it is removed from a fuel tank. These are integrated into the fuel nozzle assembly and are not retrofit-able on existing fuel nozzles.

25 SUMMARY OF THE INVENTION

 An object of certain embodiments of the present invention disclosure is to provide a dripless nozzle adapter which can be retro-fitted onto existing fuel dispensing nozzles.

 In accordance with an embodiment of an aspect of the invention, there is provided a dripless nozzle adapter, attach-able to the end of a fuel nozzle, comprising:

- 30 a) a dripped fuel collection and absorbent assembly;
- b) a flexible connection portion, attached to said dripped fuel collection and absorbent assembly; and

5 c) a connector, for connecting said flexible connection portion to the fuel nozzle.

In an embodiment, the dripped fuel collection and absorbent assembly includes: a main body, which contains absorbent materials; an absorbent component, placed inside and fastened to said main body; and a seal portion, extending from and sealing said main body.

10 In an embodiment, the main body of the dripped fuel collection and absorbent assembly includes: a body base, to attach to said flexible connection portion; a body main, containing said absorbent component; and a body cap, which captures said seal portion.

In an embodiment, the seal portion of the dripped fuel collection and absorbent assembly includes: a first seal layer, of low surface friction, which attaches to said main body; a second seal layer, mechanically elastic and fuel resistant, which seals said dripless nozzle adapter at the open end of the fuel nozzle. The first and second seal layers attach to each other, and deform together when the nozzle traverses through the seal portion. In 15 another embodiment, the first and second seal layers have two cuts, which make through both seal layers to form an 'X' shape.

In an embodiment of the flexible connection portion of the dripless nozzle adapter, 20 it is a bellow, linking the dripped fuel collection and absorbent assembly with the connector of the adapter.

In an embodiment of the connector of dripless nozzle adapter, it is a collar, comprising of: a collar spout, which is mounted on the fuel nozzle; and a collar body, mounted on the flexible connection portion. The collar spout coupled to said collar body 25 when installing the adapter on the nozzle.

It is another object of the invention to provide a nozzle for dispensing fuel into a vehicle, which has a dripless nozzle adapter attaching to the end of the fuel nozzle. The aforementioned dripless nozzle adapter covers the open end of the fuel nozzle with a seal, and encloses the area of the opening of the nozzles spout. It is installed onto the fuel nozzle by 30 placing the open end of the adapter at the tip of the fuel nozzle, and sliding it along the fuel nozzle tip until the adapter seal is near the tip of the fuel nozzle.

These and other objects of the present invention will become readily apparent upon further review of the following specification and drawings.

Advantageously, the dripples nozzle adapter according to certain embodiments of 35 the invention fully encapsulates all fuel prior to the removal of the fuel nozzle from the fuel receptacle, and prevents all leaks. Additionally, fuel that is trapped within the nozzle is absorbed by the absorbent rather than escaping due to gravity. This dripples nozzle adapter is

5 installed around the spout of fuel nozzle, retro-fitted onto existing fuel dispensing nozzles easily.

BRIEF DESCRIPTION OF THE DRAWINGS

10 These and other features, embodiments and advantages of the dripless nozzle adapter and the nozzle, according to embodiments of the invention are described in the accompanying claims, abstract and the following detailed description of non-limiting embodiments depicted in the accompanying drawings, in which description reference numerals are used which refer to corresponding reference numerals that are depicted in the drawings.

15 FIG. 1 a perspective view of a fuel nozzle with a dripless nozzle adapter according to the present invention installed on the fuel nozzle.

FIG. 2a, FIG. 2b, and FIG. 2c are breakaway, expanded views of a dripless nozzle adapter according to the present invention.

20 FIG. 3 is a breakaway, expanded view of the absorbent component of a dripless nozzle adapter according to the present invention.

FIG. 4a, FIG. 4b are breakaway, expanded views of the seal portion of a dripless nozzle adapter according to the present invention.

FIG. 5 is an installation diagram to show how to install a dripless nozzle adapter on a fuel nozzle according to the present invention.

25 Similar reference characters denote corresponding features consistently throughout the attached drawings. While the invention is susceptible to various modifications and alternative forms, specific embodiments thereof are shown by way of example in the drawings and will herein be described in detail. The drawings may not be to scale. It should be understood that the drawings and detailed description thereto are not intended to
30 limit the invention to the particular form disclosed, but to the contrary, the intention is to cover all modifications, equivalents and alternatives falling within the spirit and scope of the present invention as defined by the appended claims.

5 DETAILED DESCRIPTION OF THE DEPICTED EMBODIMENTS

In the context, unless specified otherwise, terms shall be interpreted as below:

“Coupled”, “attached” and “mounted” means either a direct connection or an indirect connection (for example, one or more intervening connections) between one or more objects or components.

10 FIG. 1 depicts a fuel nozzle (20) with a dripless nozzle adapter (10) according to an embodiment of the invention installed on it. The adapter (10) attaches to the end of the fuel nozzle (20), which covers the open end of the fuel nozzle with a seal. The adapter (10) encloses the area of the opening of the nozzle spout, thereby encapsulating drips of fuel that can occur from fuelling, after fuelling, and before fuelling. The adapter allows normal
15 operation of the fuel nozzle only when the adapter is allowed to traverse up the nozzle, exposing the tip of the nozzle.

FIG. 2 depicts the structure of a dripless nozzle adapter according to the present invention. In accordance with an embodiment of an aspect of the invention, a dripless nozzle adapter, attaching to the end of the fuel nozzle, in FIG. 2a, comprising of: a)
20 dripped fuel collection and absorbent assembly (11), which covers the open end of the fuel nozzle; b) a flexible connection portion (12), attaching to said dripped fuel collection and absorbent assembly (11); and c) a connector (13), connecting said flexible connection portion (12) to the fuel nozzle.

In an embodiment of FIG. 2b, the flexible connection portion (12) is a bellow (120),
25 linking the dripped fuel collection and absorbent assembly (11) with the connector (13) of the adapter. The bellow, along with the other components of the adapter when assembled, does not allow fuel to escape the assembly.

In an embodiment of FIG. 2c, the connector (13) is a collar (130), comprising of: a collar spout (131), which is mounted on the fuel nozzle; and a collar body (132), mounted on
30 the flexible connection portion (12) of the adapter. The collar spout (131) is coupled to said collar body (132) when installing the adapter on the nozzle. There are two tabs on the collar body (132) that interlock onto the collar spout (131) during the installation.

FIG. 3 depicts the structure of the absorbent component of a dripless nozzle adapter according to the present invention. The adapter (10) contains an absorbent component (40)
35 within the adapter body that absorbs the drips that are encapsulated by the nozzle. This absorbent component can be rapidly disposed of and replaced by a technician without destruction of the adapter (10).

5 In an embodiment, the dripped fuel collection and absorbent assembly includes: a main body (30), which contains absorbent materials; an absorbent component (40), placed inside and fastened to the main body (30); and a seal portion (50), extending from and sealing said main body (30).

10 In an embodiment, the main body (30) of the dripped fuel collection and absorbent assembly includes: a connector (301), for connecting said dripped fuel collection and absorbent assembly with said flexible connection portion, to attach to said flexible connection portion; a body main (302), containing said absorbent component; and a body cap (303), which captures said seal portion. In an embodiment, the connector (301) is also a collar (130), as shown in FIG. 2c, which makes said flexible connection portion (12)
15 reversible.

 The material of the absorbent component (40) must be compatible with (petrol and diesel) fuels. The design of current invention can accommodate multiple materials depending on what type of drips need to be captured. In an embodiment of the absorbent component (40) of the dripped fuel collection and absorbent assembly, it is made from
20 recycled news print and cellulose.

 The absorbent component (40) is placed in the main body (30) of the dripped fuel collection and absorbent assembly (11). In a production setting, this absorbent component is fastened to the body main (302) with adhesive. Alternatively, a retaining clip could be used to hold the absorbent component in place. The retaining clip may be metal or plastic.

25 FIG. 4 depicts the structure of the seal portion of a dripless nozzle adapter according to the present invention. The adapter contains a seal portion (50), which deforms to allow easy traversal of the nozzle to allow normal fuelling to occur.

 In an embodiment of the seal portion (50) of the dripped fuel collection and absorbent assembly (11), as shown in FIG. 4a, it includes: a first seal layer (501), of low surface friction, which attaches to the main body (30) of the dripped fuel collection and absorbent assembly (11); a second seal layer (502), mechanically elastic and fuel resistant, which seals the adapter at the open end of the fuel nozzle. The first and second seal layers (501, 502) attach to each other, and deform together when the nozzle traverses through the seal portion.

35 In another embodiment of FIG. 4b, the first and second seal layers (501, 502) have two cuts, which make through both seal layers to form an 'X' shape.

5 In a further embodiment, the first seal layer (501) is made of ultra-high molecular weight polyethylene (UHMW PE), or similar low surface friction material. The low friction property of this material allows for easy extension and retraction of the adapter. The second reforming seal layer (502) is made of ethylene propylene diene monomer (EPDM) rubber or similar material. This material is chosen for its mechanically elastic and fuel resistant
10 properties.

 The dripless nozzle adapter has a quick release for the seal portion (50), allowing for quick removal, inspection, or maintenance. Before assembly, all parts of the seal portion are coated with adhesive primer, so they will bond to one another. To assemble, the first-layer friction seal (501) is glued to the body main (302) using instant adhesive. Then, the
15 second-layer main reforming seal (502) is glued to the first-layer friction seal (501). Glue is applied to the inside of the body cap (303), then the body cap (303) is pressed on to the body main (302) capturing both seals. The assembly is clamped until the glue sets. Finally, two cuts are made through both seals to form an 'X' shape, which allow the nozzle spout to pass through the seals.

20 FIG. 5 depicts the installation method of how to install a dripless nozzle adapter on a fuel nozzle according to the present invention: A nozzle (20) for dispensing fuel into a vehicle, has a dripless nozzle adapter (10) attaching to the end of the fuel nozzle. The dripless nozzle adapter covers the open end of the fuel nozzle with a seal and encloses the area of the opening of the nozzles spout.

25 For installation, the adapter (10) is installed onto the fuel nozzle (20) by placing the open end of the adapter at the tip of the fuel nozzle; and sliding it along the fuel nozzle tip, until the adapter's seal portion (50) is near the tip of the fuel nozzle. The collar spout (131) is attached to the fuel nozzle through set screws that radially set against the outer diameter of the fuel nozzle spout, or by means of a tightening ring that can be screwed to press against the
30 fuel nozzle. The adapter then can travel axially along the fuel nozzle by means of a bellow (120), which links the dripped fuel collection and absorbent assembly (11) with the connector (13) at the collar spout (131). The bellow (120) conforms to the bend in the nozzle spout.

 For uninstallation, the operator of the fuel nozzle with adapter, once finished with
35 fuelling, allows the adapter to extend over the fuel nozzle tip prior to removing the fuel nozzle from the vehicle fuel tank port, and the seal portion (50) reforms back into place. The operator of the fuel nozzle can then bring the fuel nozzle away from the fuelling receptacle.

5 Therefore, the dripless nozzle adapter, the nozzle for dispensing fuel into a vehicle having said dripless nozzle adapter, and/or any products according to present invention are well adapted to attain the ends and advantages mentioned as well as those that are inherent therein.

10 The particular embodiments disclosed above are illustrative only, as the present invention may be modified, combined and/or practiced in different but equivalent manners apparent to those skilled in the art having the benefit of the teachings herein.

 Furthermore, no limitations are intended to the details of construction or design herein shown, other than as described in the claims below.

15 It is therefore evident that the particular illustrative embodiments disclosed above may be altered, combined and/or modified and all such variations are considered within the scope of the present invention as defined in the accompanying claims.

 While any methods, systems and/or products embodying the invention are described in terms of “comprising,” “containing,” or “including” various described features and/or steps, they can also “consist essentially of” or “consist of” the various described
20 features and steps.

 All numbers and ranges disclosed above may vary by some amount. Whenever a numerical range with a lower limit and an upper limit is disclosed, any number and any included range falling within the range is specifically disclosed. In particular, every range of values (of the form, “from about a to about b,” or, equivalently, “from approximately a
25 to b,” or, equivalently, “from approximately a-b”) disclosed herein is to be understood to set forth every number and range encompassed within the broader range of values.

 Also, the terms in the claims have their plain, ordinary meaning unless otherwise explicitly and clearly defined by the patentee.

30 Moreover, the indefinite articles “a” or “an”, as used in the claims, are defined herein to mean one or more than one of the element that it introduces.

 If there is any conflict in the usages of a word or term in this specification and one or more patent or other documents that may be cited herein by reference, the definitions that are consistent with this specification should be adopted.

CLAIMS

What is claimed is:

- 5 1. A dripless nozzle adapter, adapted to be attached to the end of a fuel nozzle, comprising:
 - (a) a dripped fuel collection and absorbent assembly;
 - (b) a flexible connection portion, attached to said dripped fuel collection and absorbent assembly; and
 - 10 (c) a connector, for connecting said flexible connection portion to the fuel nozzle.
2. The adapter according to claim 1, wherein said dripped fuel collection and absorbent assembly includes:
 - (a) a main body, which contains absorbent materials;
 - 15 (b) an absorbent component, placed inside and fastened to said main body; and
 - (c) a seal portion, extending from and sealing said main body.
3. The adapter according to claim 2, wherein said main body includes:
 - (a) a connector, for connecting said dripped fuel collection and absorbent assembly with said flexible connection portion;
 - 20 (b) a body main, containing said absorbent component; and
 - (c) a body cap, which captures said seal portion.
4. The adapter according to claim 2, wherein said seal portion including:
 - (a) a first seal layer, of low surface friction, which attaches to said main body;
 - (b) a second seal layer, mechanically elastic and fuel resistant, which seals said
 - 25 adapter at the open end of the fuel nozzle;

said first and second seal layers attaching to each other and deform together when the nozzle traverses through said seal portion.
5. The adapter according to claim 4, wherein said first and second seal layers have two cuts, which make through both seal layers to form an 'X' shape.
- 30 6. The adapter according to claim 1, wherein said flexible connection portion is a bellow, linking said dripped fuel collection and absorbent assembly with said connector of the adapter.
7. The adapter according to claim 1, wherein said connector is a collar, comprising of:
 - (a) a collar spout, which is mounted on the fuel nozzle;
 - 35 (b) a collar body, mounted on said flexible connection portion;

- 5 said collar spout is coupled to said collar body when installing the adapter on the nozzle.
8. A nozzle for dispensing fuel into a vehicle, said nozzle comprising:
- (a) a dripless nozzle adapter, attached to an open end of the fuel nozzle, which covers and encloses the open end of the fuel nozzle with a seal; and
- 10 (b) a normal nozzle;
- wherein said dripless nozzle adapter is attached at the tip of the fuel nozzle, where the adapter seal is near the tip of the fuel nozzle.
9. The nozzle for dispensing fuel into a vehicle according to claim 8, having a dripless nozzle adapter which attaches to the end of the fuel nozzle, said dripless nozzle
- 15 adapter comprising:
- (a) a dripped fuel collection and absorbent assembly, which covers the open end of the fuel nozzle;
- (b) a flexible connection portion, attached to said dripped fuel collection and absorbent assembly; and
- 20 (c) a connector, for connecting said flexible connection portion to the fuel nozzle.
10. The nozzle for dispensing fuel into a vehicle according to claim 9, wherein said dripped fuel collection and absorbent assembly includes:
- (a) a main body, which contains absorbent materials;
- 25 (b) an absorbent component, placed inside and fastened to said main body; and
- (c) a seal portion, extending from and sealing said main body.
11. The nozzle for dispensing fuel into a vehicle according to claim 10, wherein said main body includes:
- (a) a connector, for connecting said dripped fuel collection and absorbent
- 30 assembly with said flexible connection portion;
- (b) a body main, containing said absorbent component; and
- (c) a body cap, which captures said seal portion.
12. The nozzle for dispensing fuel into a vehicle according to claim 10, wherein said seal portion including:
- 35 (a) a first seal layer, of low surface friction, which attaches to said main body;
- (b) a second seal layer, mechanically elastic and fuel resistant, which seals said adapter at the open end of the fuel nozzle;

- 5 said first and second seal layers attaching to each other and deform together when the nozzle traverses through said seal portion.
13. The nozzle for dispensing fuel into a vehicle according to claim 12, wherein said first and second seal layers have two cuts, which make through both seal layers to form an 'X' shape.
- 10 14. The nozzle for dispensing fuel into a vehicle according to claim 9, wherein said flexible connection portion is a bellow, linking said dripped fuel collection and absorbent assembly with said connector of the adapter.
15. The nozzle for dispensing fuel into a vehicle according to claim 9, wherein said connector is a collar, comprising of:
- 15 (a) a collar spout, which is mounted on the fuel nozzle;
- (b) a collar body, mounted on said flexible connection portion;
- said collar spout is coupled to said collar body when installing the adapter on the nozzle.

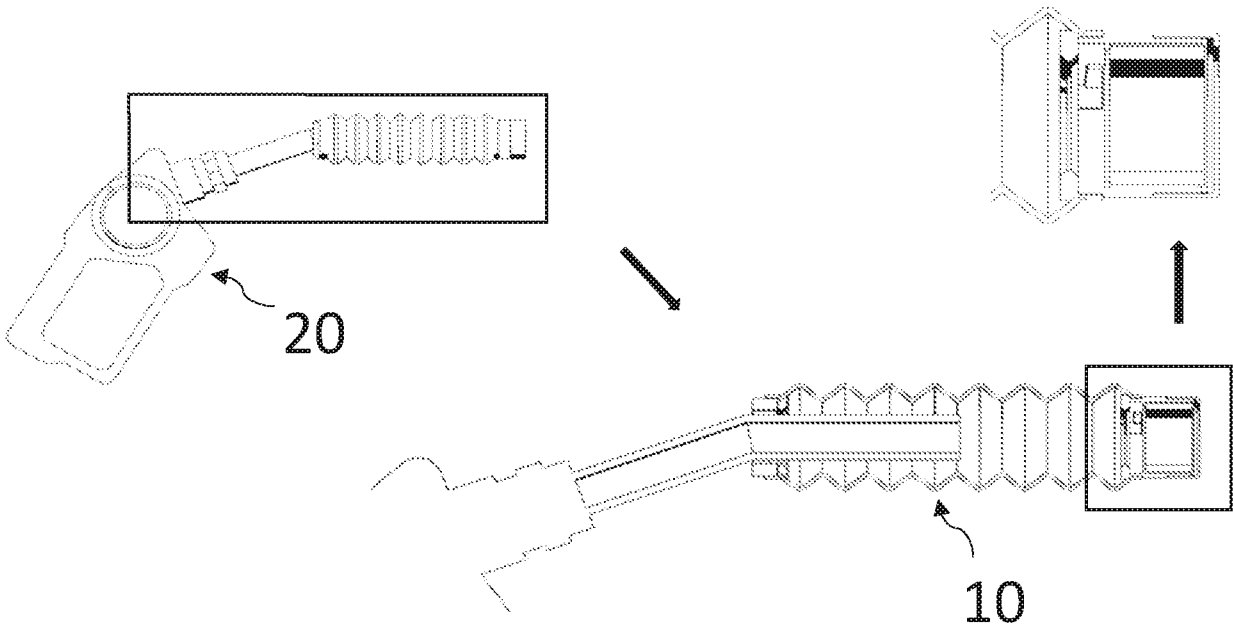


FIG. 1

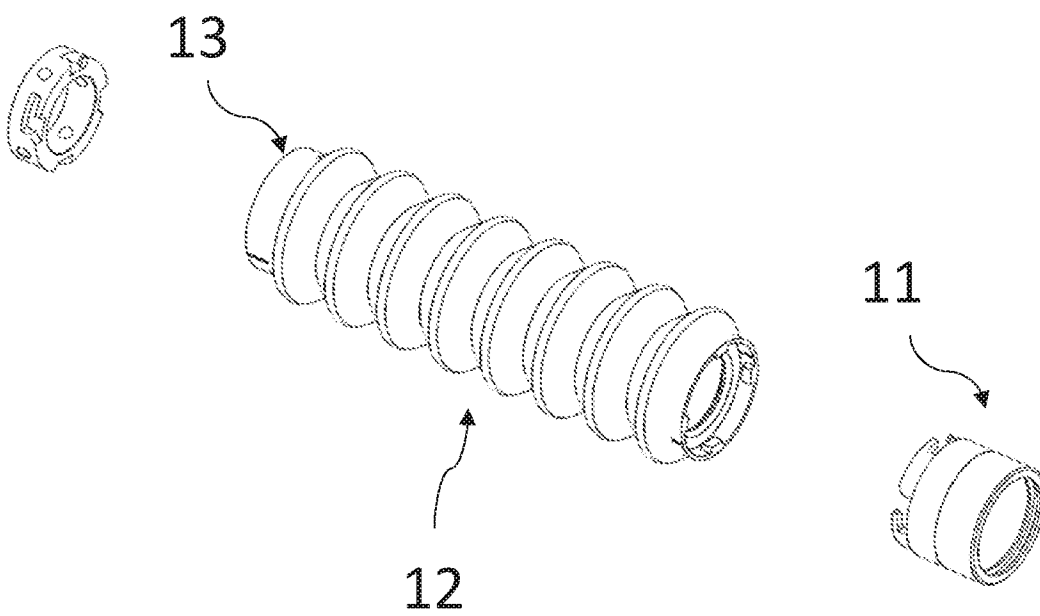


FIG. 2a

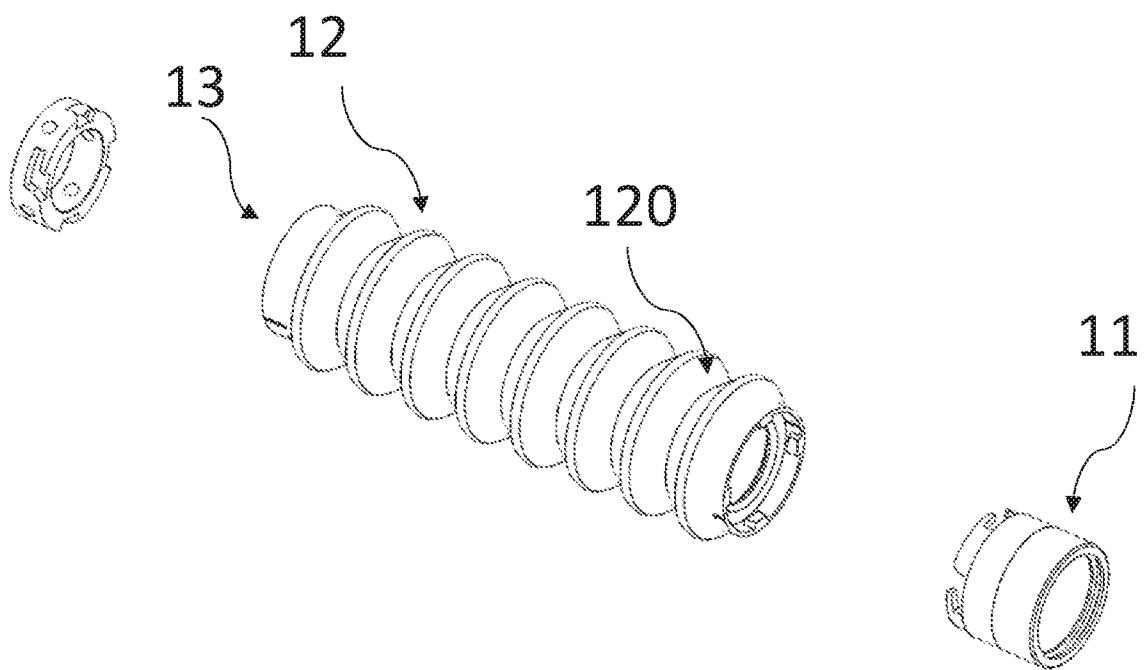


FIG. 2b

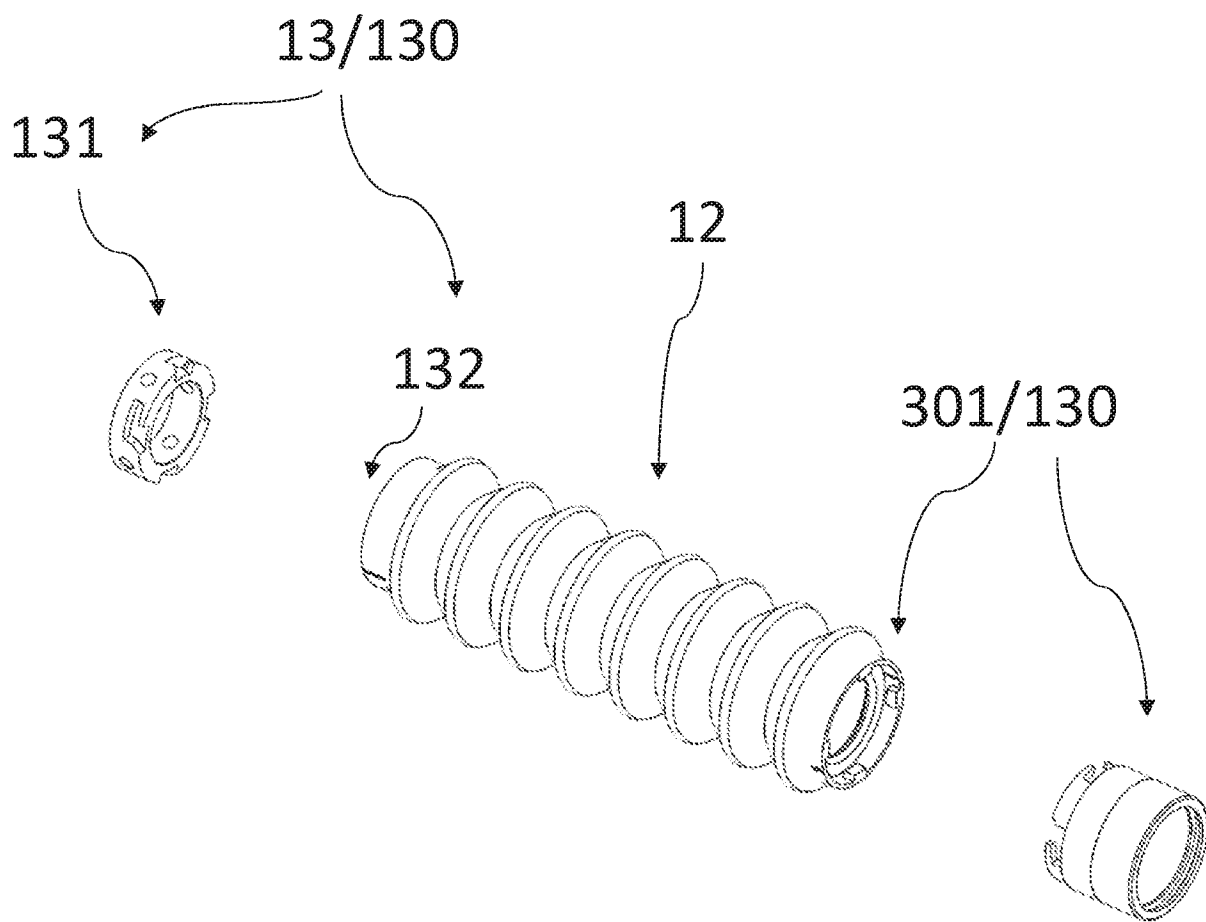


FIG. 2c

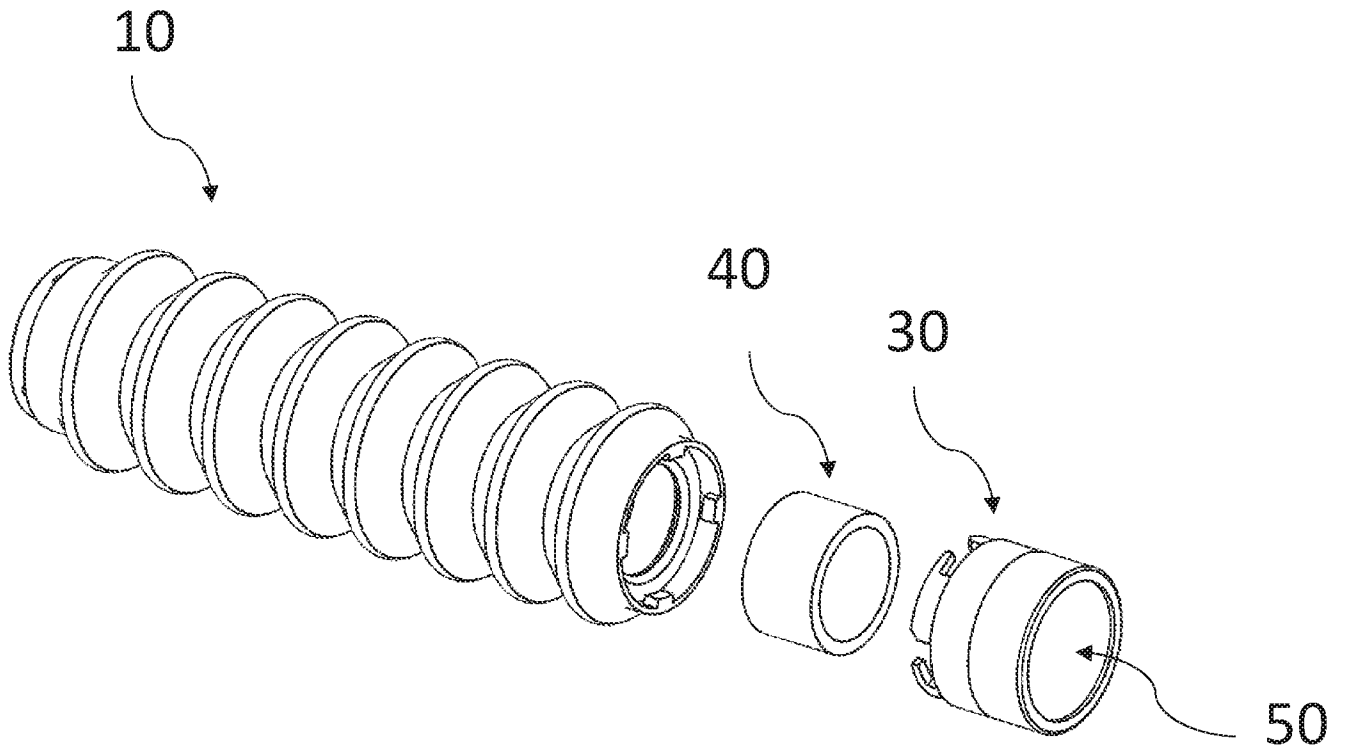


FIG. 3

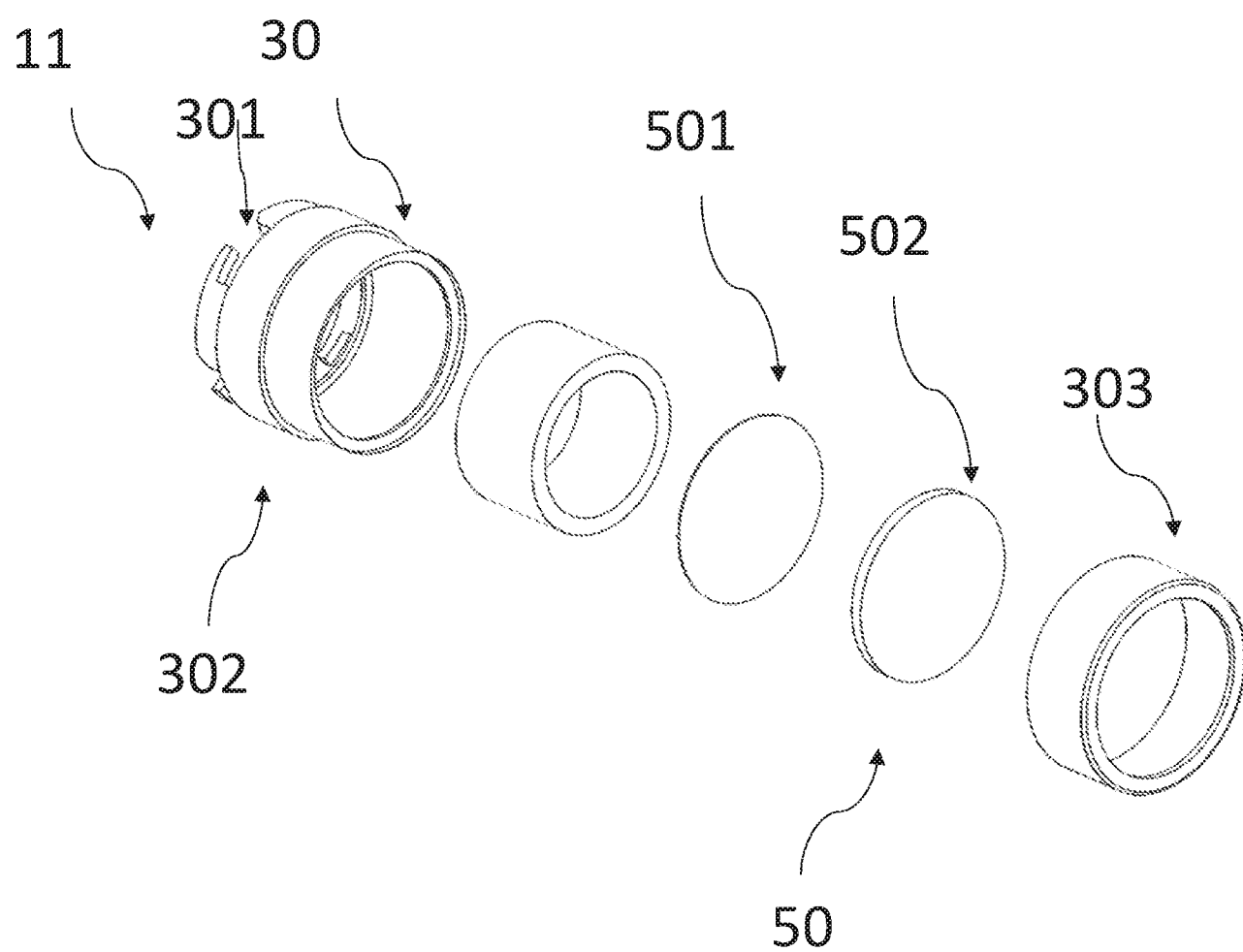


FIG. 4a

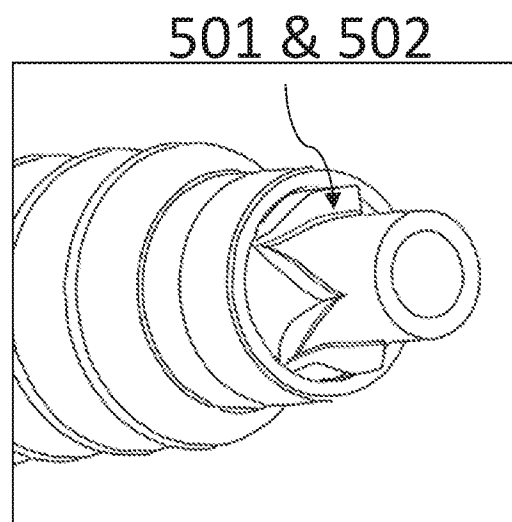
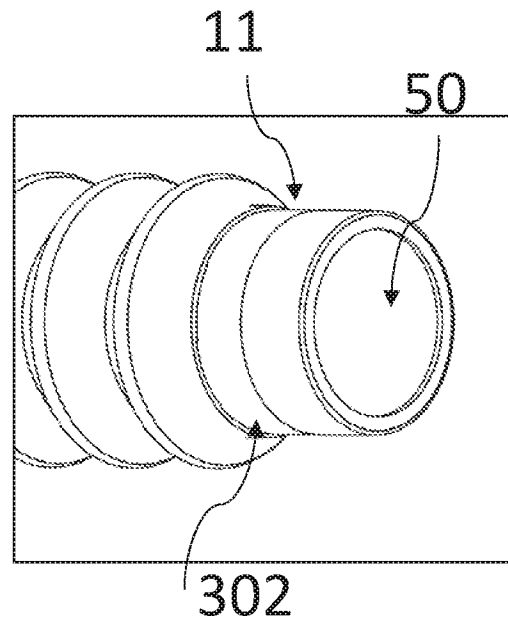


FIG. 4b

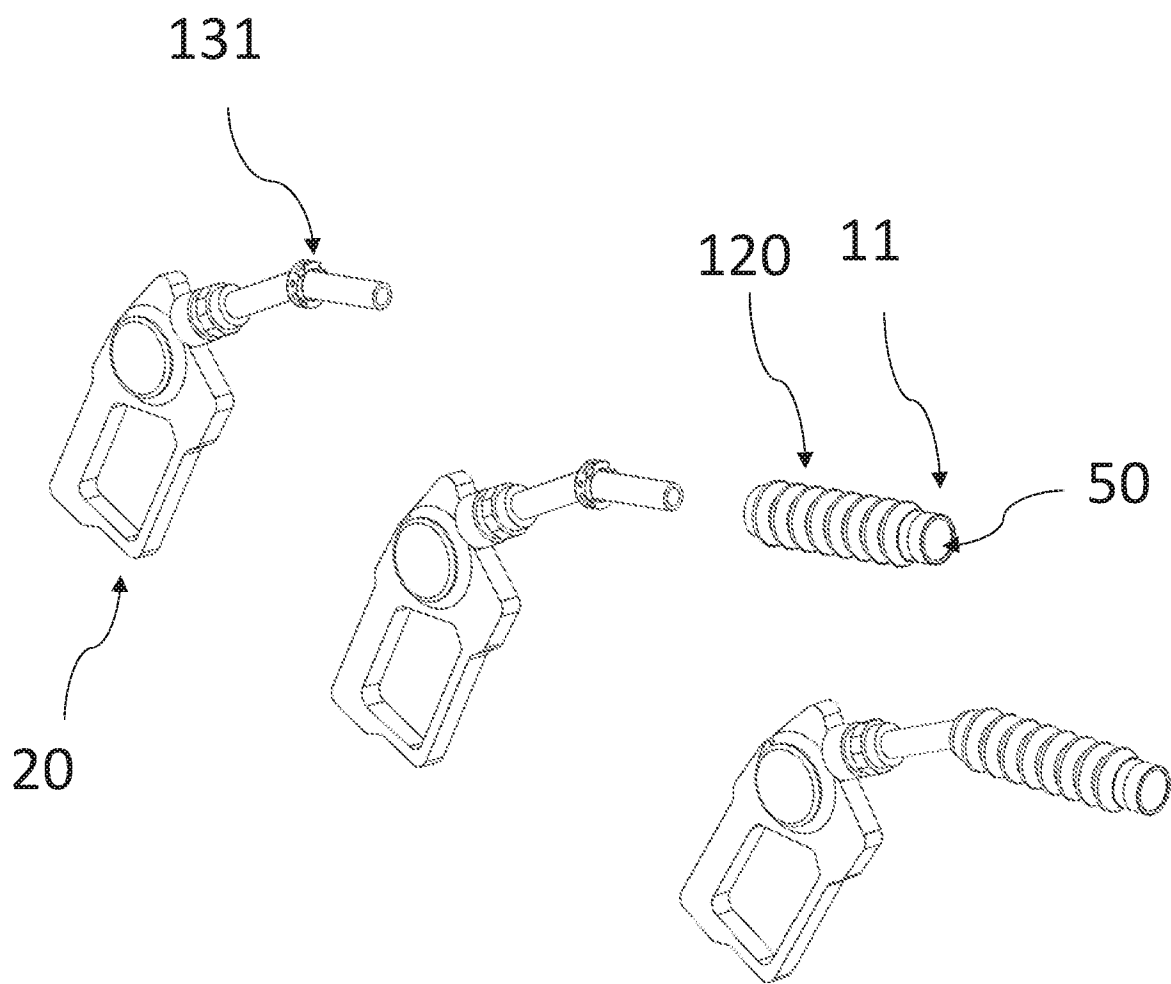


FIG. 5

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2018/021959

A. CLASSIFICATION OF SUBJECT MATTER
INV. B67D7/32 B67D7/42
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)
B67D

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 9 022 082 B1 (SIGNALNESS BRYAN RICHARD [US]) 5 May 2015 (2015-05-05)	1,7
Y	column 3, line 3 - column 4, line 6; figures 3, 4, 6-8, 10-12	2-6,9-15
X	WO 2011/148363 A1 (KAIL TAL [IL]; COHEN EYAL [IL]) 1 December 2011 (2011-12-01)	8
Y	page 3, line 9 - page 5, line 19 page 8, line 1 - page 10, line 28 figures 2, 3, 4, 5, 6, 7,	2-6,9-15
X	US 7 581 572 B1 (SUTERA JANET M [US] ET AL) 1 September 2009 (2009-09-01)	8
	column 2, line 57 - column 4, line 65; figures 2-6	
	----- -/-	



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

15 May 2018

Date of mailing of the international search report

25/05/2018

Name and mailing address of the ISA/

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Schultz, Tom

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2018/021959

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2007/049971 A1 (FEVAAG JONNY [NO]) 3 May 2007 (2007-05-03) page 4, line 2 - page 5, line 23 figures 1, 2 -----	1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2018/021959

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