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(54) **PLUG AND MANHOLE COVER WITH PLUG**

(57) The present disclosure relates to a manhole cover and plug therefore. At least the plug 1 is configured to selectively close an inspection hole in the manhole cover 2. To this end the plug 1 comprises a plug body 3 to be inserted in or arranged over a through hole 14 of

manhole cover 2. The plug body 3 has an inspection probe passage 4 extending through or along the plug body 3. Further, the plug body 3 is moveable in a face of the manhole cover to selectively open the inspection probe passage 4.

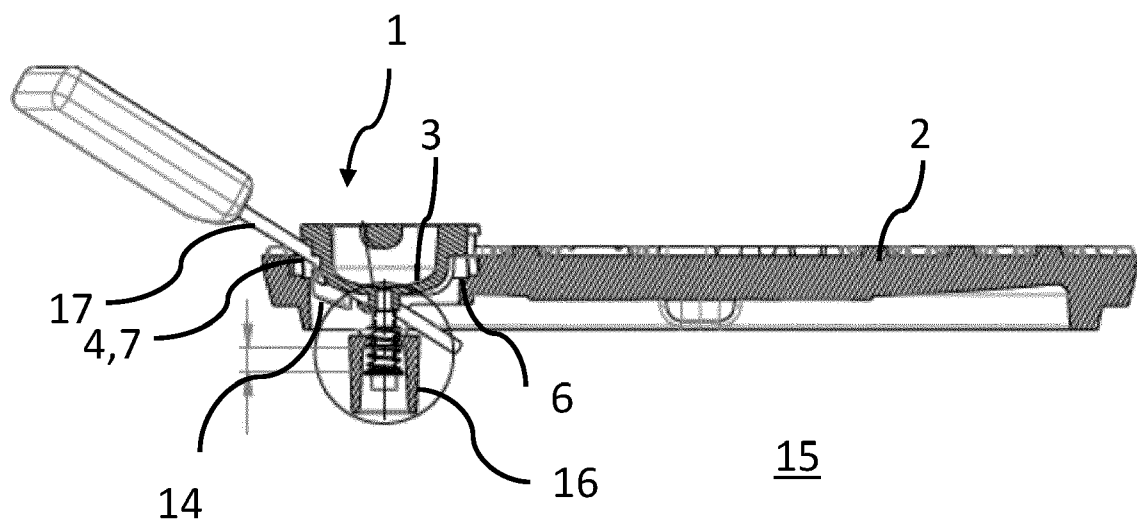


Fig. 5

Description

FIELD

[0001] The present disclosure relates to the field of manhole covers.

BACKGROUND

[0002] Manhole covers are for example configured to cover a manhole defining an opening or entrance to a space from a group comprising at least: a sewer, a tank, and a storage. Behind such a manhole cover, sometimes dangerous and even explosive gasses may accumulate, resulting in a dangerous situation when a person removes the manhole cover from the manhole, for example for maintenance.

[0003] The inventors of the present disclosure are aware of their own previous disclosure in NL-1043688, which relates to a valve in a manhole cover, enabling the introduction of an inspection probe through the manhole cover to detect whether gasses have accumulated behind the manhole cover, i.e. in the manhole. It is noted here that the in addition, it would be possible to insert a scope through such a valve, and the present disclosure is not restricted to any particular type of detector.

[0004] Although the known valve functions properly, the inventors of the present disclosure have come to realise that improvements may be achieved relative to the known valve.

SUMMARY

[0005] The present disclosure relates to a plug that provides improvements over the prior art.

[0006] To this end a plug is configured to selectively close an inspection hole in a manhole cover, in that the plug comprises a plug body and an inspection probe passage extending through the plug body. The plug body is moveable in a face of the manhole cover to selectively open the inspection probe passage.

[0007] In an embodiment, the plug according to this disclosure may exhibit the feature that the plug body is configured to be arranged rotatably in the manhole cover.

[0008] In an additional or alternative embodiment, the plug according to this disclosure may exhibit the feature that the plug body is liftable from the manhole cover to expose the inspection probe passage.

[0009] In an embodiment, in which the plug body is rotatable and liftable, the plug according to this disclosure may exhibit the feature that the plug body comprises a thread or ramp at the circumference thereof, while the manhole cover comprises a counter-thread or ramp to lift the plug body upon rotation of the plug body in a direction parallel to the face of the manhole cover.

[0010] In an additional or alternative embodiment, the plug according to this disclosure may exhibit the feature that the inspection probe passage comprises a seal. In

this embodiment, the plug according to this disclosure may exhibit the feature that the seal comprises a membrane with at least one slit to accommodate an inspection probe to extend through the membrane. Additionally or alternatively, in this embodiment, the seal may comprise a guide tube mounted on the plug body. Such a guide tube may be mounted on the plug body via a bracket.

[0011] In an additional or alternative embodiment, the plug according to this disclosure may exhibit the feature of at least one spring configured to urge the plug body to an inspection probe passage closing position.

[0012] In an additional or alternative embodiment, the plug according to this disclosure may exhibit the feature of at least one recess in an outward oriented surface thereof, when arranged in the manhole cover, to accommodate a manhole cover lifting tool to manipulate the plug body therewith for movement of the plug body parallel to or in the face of the manhole cover.

[0013] Further the present disclosure relates to a manhole cover configured to cover a manhole defining an opening or entrance to a space from a group comprising at least: a sewer, a tank, and a storage, comprising a through hole in the manhole cover and a plug as disclosed herein above and below in or on the through hole.

[0014] In an embodiment, the manhole cover according to this disclosure may further comprise a protective stud at the through hole. Then, the protective stud may form a basis for above mentioned spring, to urge the plug body to the inspection probe passage closing position.

[0015] Also, the present disclosure relates to a sewer system comprising conduits and manholes for access to the conduits, and a manhole cover on at least one manhole.

BRIEF DESCRIPTION OF THE DRAWING

[0016] In the appended drawing, embodiments of manhole covers and plugs and components thereof are shown in non-limiting embodiments, wherein the same or similar elements, components and functional aspects may be designated throughout the drawing with the same or similar reference signs and wherein:

FIG. 1 exhibits a frontal view of a manhole cover with a plug;

FIG. 2 exhibits a cross sectional view of the manhole cover with a plug in FIG. 1;

FIG. 3 exhibits a detail of FIG. 2;

FIG. 4 exhibits a downward perspective view of the plug of FIGs 1-3;

FIG. 5 exhibits a similar view as FIG. 2, after rotation of the plug;

FIG. 6 exhibits an upward perspective view of the plug of FIGs 1-3;

FIG. 7 exhibits a seal, to be mounted under the plug;

FIG. 8 shows a view in the direction of arrow B in FIG. 7; and

FIGs 9 and 10 exhibit an alternative embodiment, in exploded views; and
 FIG. 11 exhibits a perspective view in the direction of arrow E in FIG. 2.

DETAILED DESCRIPTION OF EMBODIMENTS

[0017] In FIGs. 1- 8 and 11, a first embodiment of the present disclosure is shown. FIGs 9 and 10 show a second embodiment in exploded views. The same or similar aspects, components and functional features in the first and second embodiments are designated by the same or similar reference signs, and any differences will be discussed in the below embodiment description.

[0018] In the first embodiment of figures 1- 8 and 11, a manhole cover 2 on a manhole 15 is provided with a plug 1 arranged in a through hole 14 extending through manhole cover 2. Plug 1 is configured to selectively close an inspection hole in manhole cover 2. The inspection hole may be defined by the through hole 14, or may be formed through plug 1.

[0019] When preparing to open a manhole by removing manhole cover 2, workers may need to be aware of accumulated gasses in the manhole behind the manhole cover. A reason for this is that for example in the case of manhole 15 of a sewer system, explosive or toxic gasses may accumulate behind manhole cover 2 in manhole 15, to be released when manhole cover 2 is removed. The present disclosure facilitates insertion of a probe 17 of an inspection device, such as a gas sensor.

[0020] To this end plug 1 comprises a plug body 3 and an inspection probe passage 4 extending through plug body 3. Plug body 3 is moveable in a face of manhole cover 2 to selectively open inspection probe passage 4. This is achieved in the embodiment of FIGs 1-8 and 11 by a configuration wherein plug body 3 is rotatable in manhole cover 2. The orientation of rotation of plug body 3 is dictated by the feature that the plug body is moveable in a plane corresponding with or parallel to a surface of face of manhole cover 2. More in detail, plug body 3 is rotatable around a rotation axis 20, while seated in through hole 14 of manhole cover 2.

[0021] Plug body 3 is held in through hole 14 of manhole cover 2 by a rod 18. Rod 18 extends from plug body 3, where rod 18 is inserted into a hole 19, through a stud 16. Stud 16 forms a part of manhole cover 2 or is attached thereto. At the free end of rod 18, opposite plug body 3, a shoulder or widening 21 is provided. The widening 21 can be formed by a bolt screwed on threaded rod 18. A spring 9 extends between stud 16 and widening 21 at the end of rod 18. Thus spring 9 pulls plug body 3 into through hole 14, to close the same. Spring 9 is thus configured to urge plug body 3 to an inspection probe passage 4 closing position.

[0022] In addition to stud 16 forming a basis for spring 9 pulling plug body 3 into the through hole 14, stud 16 also forms a protection for the underside of the plug body 3 and in particular for a guide tube 11, to be discussed in

more detail below. Namely, when manhole cover 2 is manipulated to be removed from manhole 15, while manhole cover 2 is very heavy, using a hook shaped tool inserted in a recess in an upper surface of the manhole cover, it is most often dragged from manhole 15 in the direction of arrow F in FIG. 11. Protective stud 16 is shaped in the form of a curved bulge to slide manhole cover 2 over an edge of manhole 15, while protective stud 16 contacts this edge of manhole 15. Thus, the underside of plug 1 is protected from being damaged as manhole cover 2 is slid over this edge of manhole 15. Any other type of protective stud may be employed, which may preferably have a slide surface, like the shown curved bulge, in a direction F in which manhole cover 2 is expected to be dragged from manhole 15 over an edge thereof. With plug 1 centrally positioned in manhole cover 2, a cross shaped or semi-spherical bulging stud may be provided.

[0023] In the first embodiment, plug body 3 is liftable from manhole cover 2 to expose the inspection probe passage 4 at a circumference of plug body 3. When plug body 3 is rotated around axis 20 in the plane or face or surface of manhole cover 2, or parallel thereto, it is raised from through hole 14. To achieve this, on a side of plug body facing through hole 14, a ramp 5 is provided. A corresponding counter ramp 6 is provided on manhole cover 2, wherein plug body 3 is raised when rotated, against a pulling force of spring 9. Plug body 3 comprises ramp 5 at the circumference thereof, and facing away from plug body 3. Alternative configurations may be applied. For example, a screw thread may be provided on a side of plug body 3, with a counter screw thread on an inside of through hole 14. When plug body 3 is lifted from manhole cover 2 upon rotation of the plug body 3 in a direction parallel to the face of the manhole cover 2, an entrance between the side of plug body 3 and an edge of through hole 14 is opened for inserting an inspection probe 17.

[0024] The inspection probe passage 4 comprises a seal 7. Seal 7 may comprise a guide tube 11, which is mounted via a bracket 12 on plug body 3 on the side thereof facing the through hole 14 in manhole cover 2. A screw 22 may be used to mount bracket 12 to plug body 3 in the direction indicated by arrow D extending between FIGs 7 and 6. To prevent gas leakage, guide tube 11 houses a membrane 8 with a slit 10. When inserting inspection probe 17 through guide tube 11, inspection probe 17 will poke through slit 10, and when withdrawing inspection probe 17 out of guide tube 11, membrane 8 with slit 10 therein acts as a scraper to remove any material clinging to inspection probe 17.

[0025] In a side of plug body, facing away from manhole cover 2, at least one recess 13 is formed. Because recess 13 is provided in an outward oriented surface thereof, opposite manhole 15, a manhole cover lifting tool - usually a bar with a hook on one end and a handle on the other - may be inserted into such recess 13. Then the manhole cover lifting tool can be operated to manipulate

and rotate plug body 3 therewith. The movement of plug body 3 is thus parallel to or in the face of manhole cover 2 and rotational. Thus, the same tool may be used to rotate plug body 3 that is also used to engage manhole cover 2 in similar recesses 13 arranged in the top surface of manhole cover 2 in FIG. 1, to lift and / or drag so engaged manhole cover 2 from manhole 15.

[0026] In the embodiment of FIGs 9 and 10, which are exploded views, manhole cover 2 comprises though hole 14, over which plug body 3 extends. Plug body 3 is a disc that is rotatable around axis 20, along which a rotation shaft. In use, plug body 3 is arranged directly on top of manhole cover 2 with spring 9 arranged there between, where in this embodiment spring 9 is helical, to urge plug body 3 to a rotational position opposite arrow C. When disc shaped plug body 3 is rotated in the direction of arrow C, for example using any tool that fits inside inspection probe passage 4 extending through plug body 3, the operator may align, allowing inspection probe 17 to be inserted into manhole 15. To this end, another engagement point (e.g. a limited depth hole) may be provided to insert any tool, and prevent such a tool may block the inspection probe passage 4 from insertion by the inspection probe 17.

[0027] For convenience, manhole cover 2 and rotatable plug body 3 may be provided with indicators in the top surface thereof to allow the operator to easily determine when alignment of inspection probe passage 4 and through hole 14 has been achieved, to then proceed with insertion of inspection probe 17.

[0028] Either of both of inspection probe passage 4 and through hole 14 may house a membrane 8 with a slit 10 like in the first embodiment in figure 8.

[0029] Optionally, in the embodiment of FIGs 9 and 10, it may also be possible to lift or raise plug body 3 off manhole cover 2, by employing a similar configuration as in FIG. 3, with a pull rod 18 and spring between manhole cover 2 and widening 21 on pulling rod 18. The possibility of lifting plug body 3 off of manhole cover 2 may serve for access to helical spring 9.

[0030] Further optionally, a combination of part-circular pin and track is provided between body 3 and manhole cover 2, to define extreme positions of body 3 and manhole cover 2 relative to one another, and align inspection probe passage 4 and through hole 14 in one of these extreme positions.

[0031] In another embodiment, plug body 3 may swivel around an axis that is arranged off-center relative to plug body 3, to cover or provide access to through hole 14, depending on the swivel position.

[0032] It is apparent that the present disclosure allows for a considerable simplification relative to at least the above acknowledged prior publication in the name of the same inventors as of the present disclosure.

[0033] As is apparent from the above disclosure of embodiments of plugs 1, the disclosure equally relation to a combination or assembly of such plugs with manhole covers 2, configured to cover a manhole defining an

opening or entrance to a space from a group comprising at least: a sewer, a tank, and a storage. Alternatively, it's possible to define the disclosure in terms of a kit-of-parts comprising a plug and a manhole cover. Likewise, a sewer system comprising conduits and manholes for access to the conduits is beneficially improved when deploying therein manhole covers 2 with plugs 1 according to the present disclosure on at least one manhole.

[0034] The terminology used herein is for the purpose of describing particular embodiments only and is not intended to be limiting of the invention. As used herein, the singular forms "a," "an," and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise. It will be further understood that the terms "comprises" and/or "comprising," when used in this specification, specify the presence of stated features, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components, and/or groups thereof.

[0035] The corresponding structures, materials, acts, and equivalents of all means or step plus function elements in the claims below are intended to include any structure, material, or act for performing the function in combination with other claimed elements as specifically claimed. The description of embodiments of the present invention has been presented for purposes of illustration, but is not intended to be exhaustive or limited to the implementations in the form disclosed. Many modifications and variations will be apparent to those of ordinary skill in the art without departing from the scope and spirit of the present invention. The embodiments were chosen and described in order to best explain the principles and some practical applications of the present invention, and to enable others of ordinary skill in the art to understand the present invention for various embodiments with various modifications as are suited to the particular use contemplated.

Claims

1. A plug (1) configured to selectively close an inspection hole in a manhole cover (2), comprising:
 - a plug body (3);
 - an inspection probe passage (4) extending through or along the plug body (3);
 - wherein the plug body (3) is moveable in a face of the manhole cover to selectively open the inspection probe passage (4).
2. The plug according to claim 1, wherein the plug body (3) is configured to be arranged rotatably in the manhole cover (2).
3. The plug according to claim 1 or 2, wherein the plug body (3) is liftable from the manhole cover (2) to

expose the inspection probe passage (4).

manhole.

4. The plug according to claims 2 and 3, wherein the plug body (3) comprises a thread or ramp (5) at the circumference thereof, while the manhole cover (2) comprises a counter-thread or ramp (6) to lift the plug body (3) upon rotation of the plug body (3) in a direction parallel to the face of the manhole cover (2). 5
5. The plug according to any of the preceding claims, wherein the inspection probe passage (4) comprises a seal (7). 10
6. The plug according to claim 5, wherein the seal (7) comprises a membrane (8) with at least one slit (9) to accommodate an inspection probe to extend through the membrane. 15
7. The plug according to claim 5 or 6, wherein the seal (7) comprises a guide tube (11) mounted on the plug body (3). 20
8. The plug according to claim 7, wherein the guide tube (11) is mounted on the plug body (3) via a bracket (12). 25
9. The plug according to any of the preceding claims, further comprising at least one spring (9) configured to urge the plug body (3) to an inspection probe passage (4) closing position. 30
10. The plug according to any of the preceding claims, further comprising at least one recess (13) in an outward oriented surface thereof, when arranged in the manhole cover (2), to accommodate a manhole cover lifting tool to manipulate the plug body (3) therewith for movement of the plug body (3) parallel to or in the face of the manhole cover (2). 35
11. A manhole cover (2) configured to cover a manhole defining an opening or entrance to a space from a group comprising at least: a sewer, a tank, and a storage, comprising a through hole (14) in the manhole cover (2) and a plug (1) according to any of the preceding claims in or on the through hole (14). 40 45
12. The manhole cover according to claim 11, further comprising a protective stud (16) at the through hole (14). 50
13. The manhole cover according to claim 12, wherein the protective stud (16) forms a basis for the spring (9) of claim 9, to urge the plug body (3) to the inspection probe passage (4) closing position. 55
14. A sewer system comprising conduits and manholes for access to the conduits, and a manhole cover (2) according to claim 11, 12 or 13 on at least one

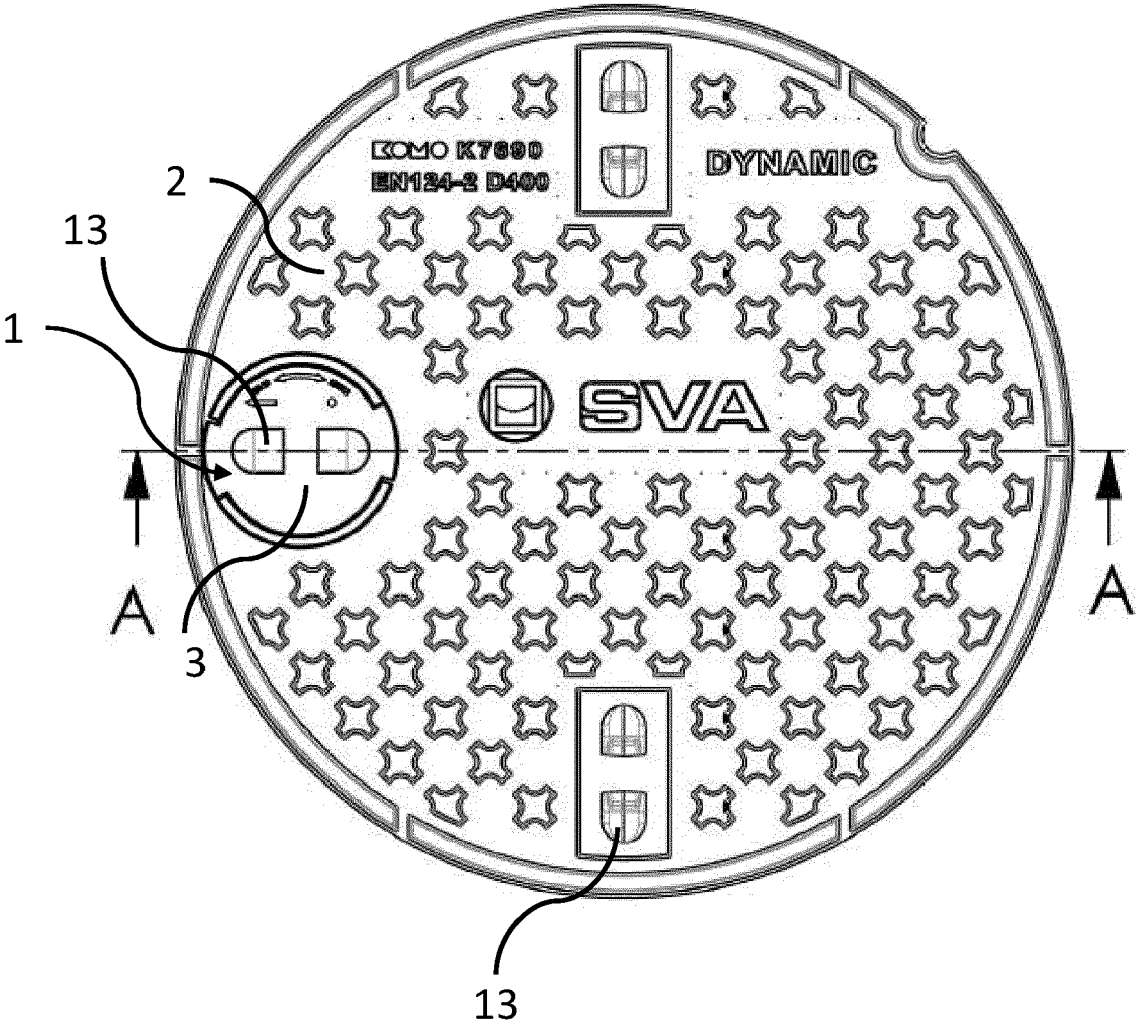
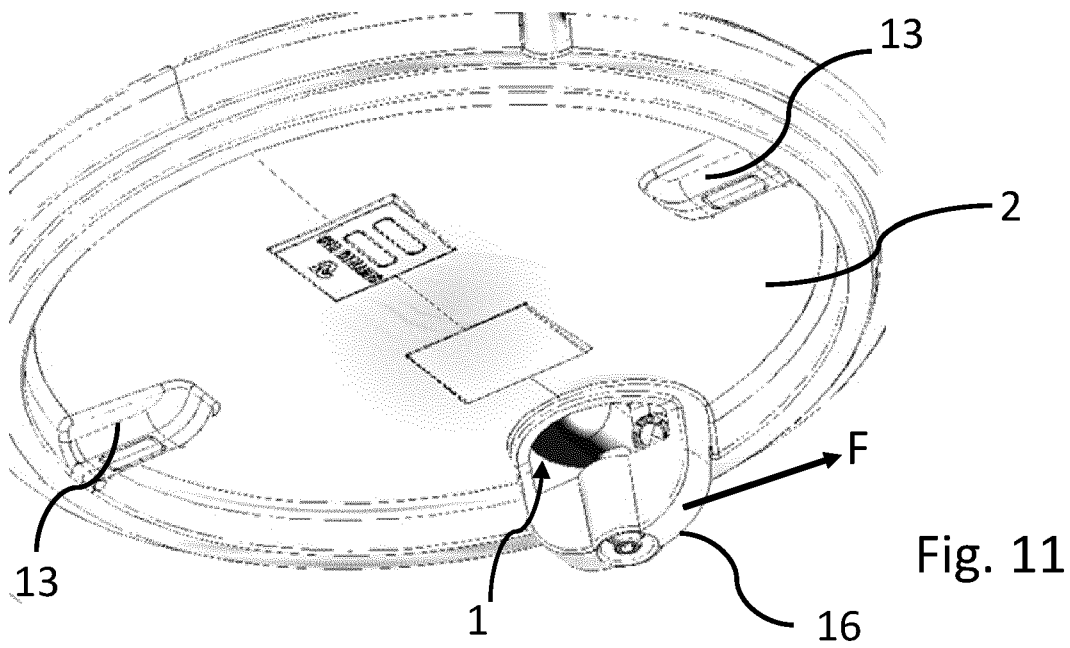
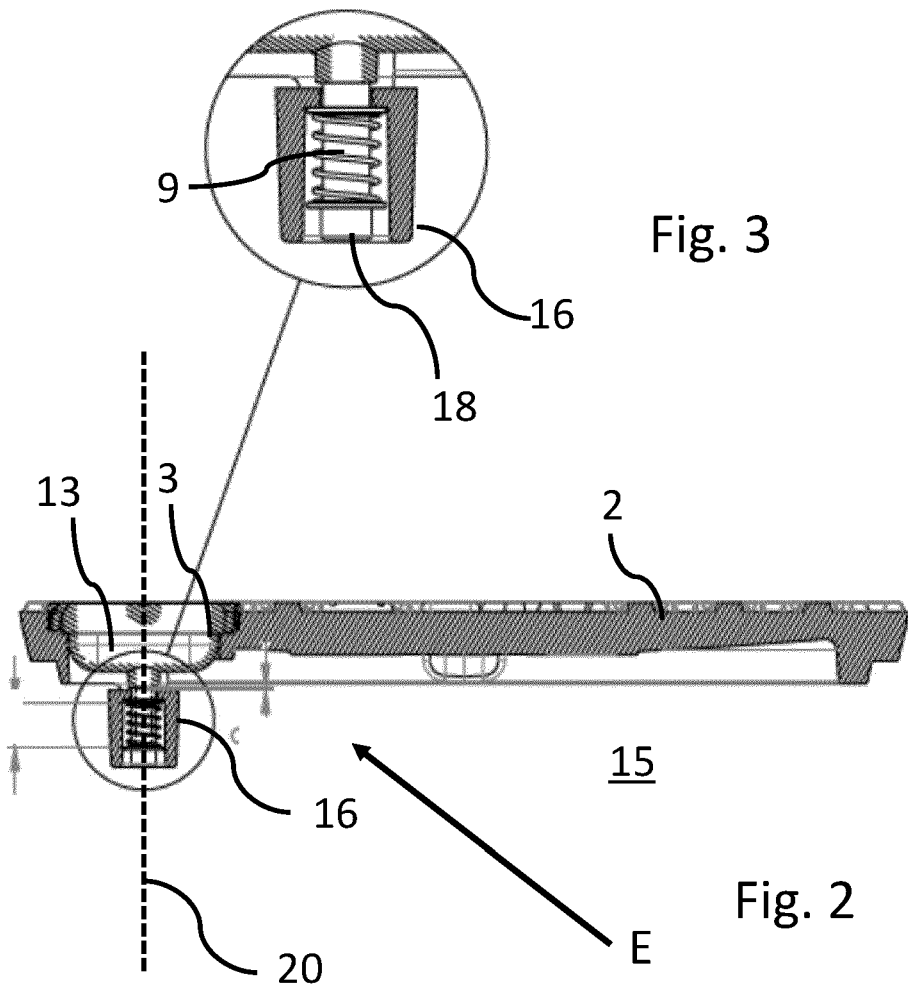


Fig. 1



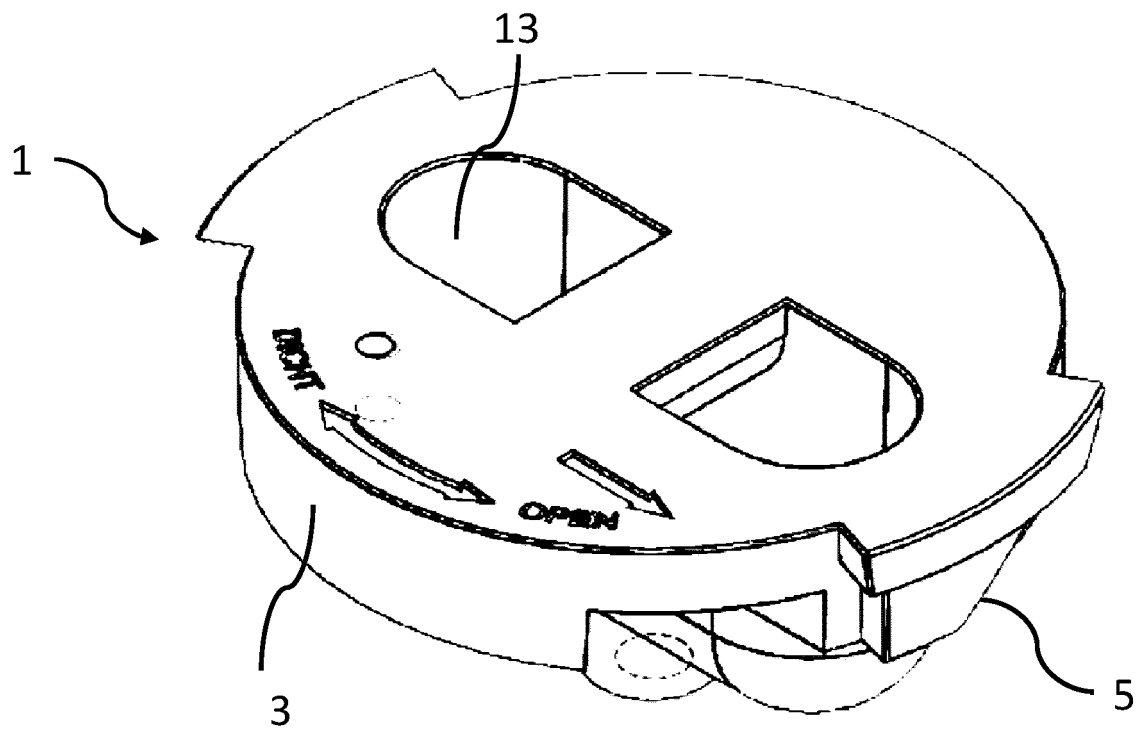


Fig. 4

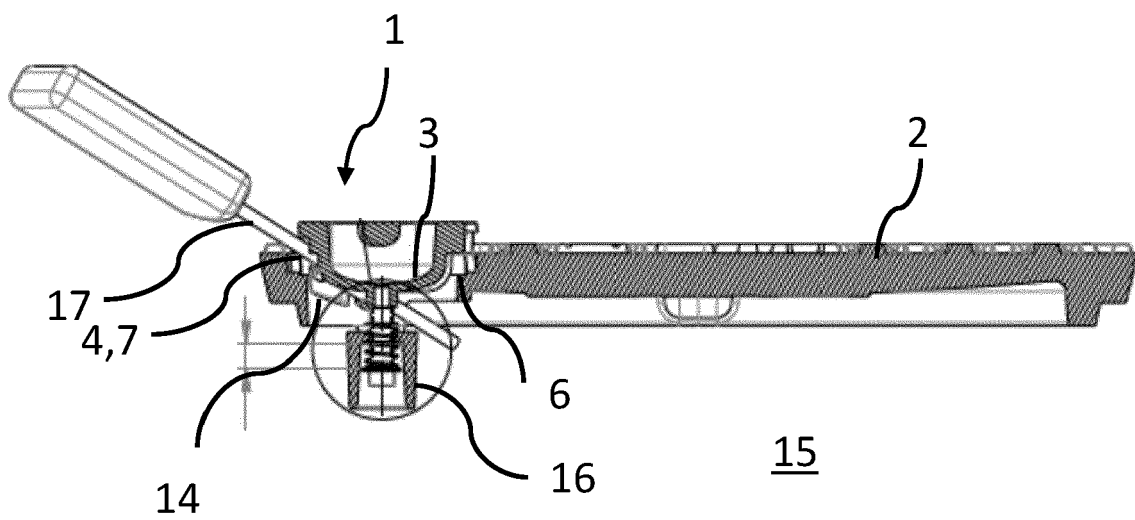


Fig. 5

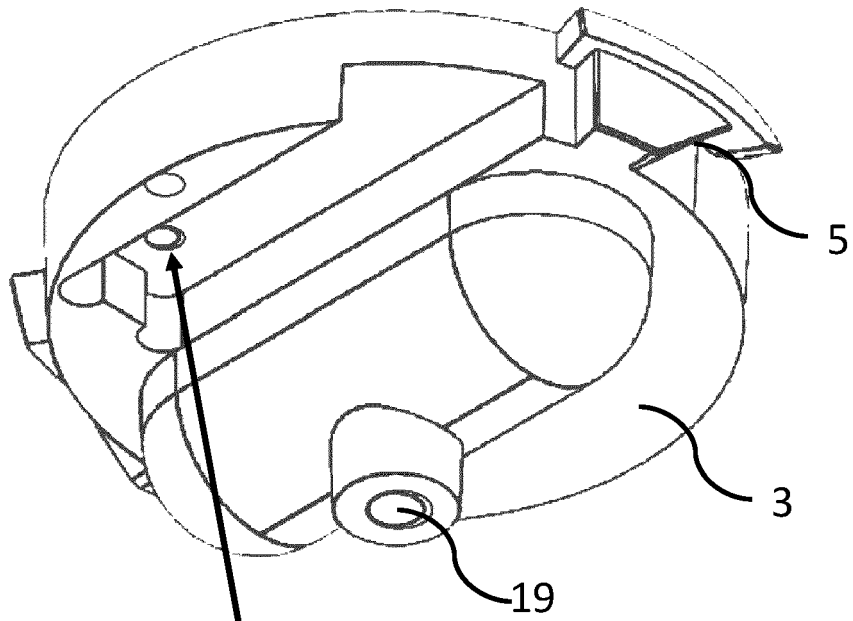


Fig. 6

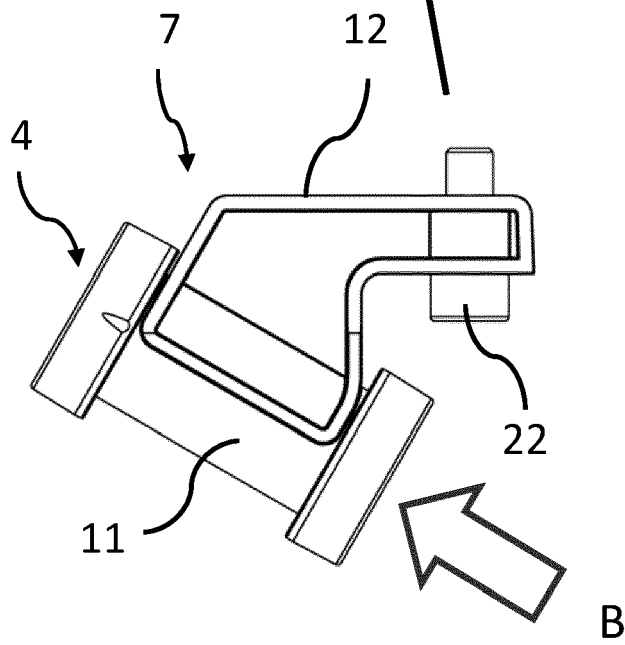


Fig. 7

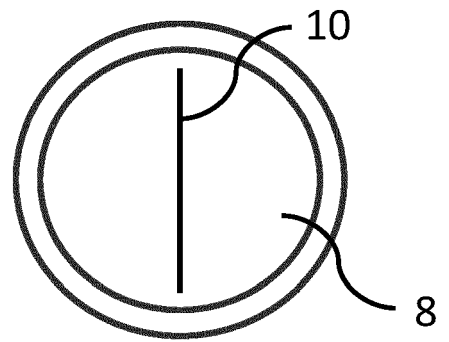
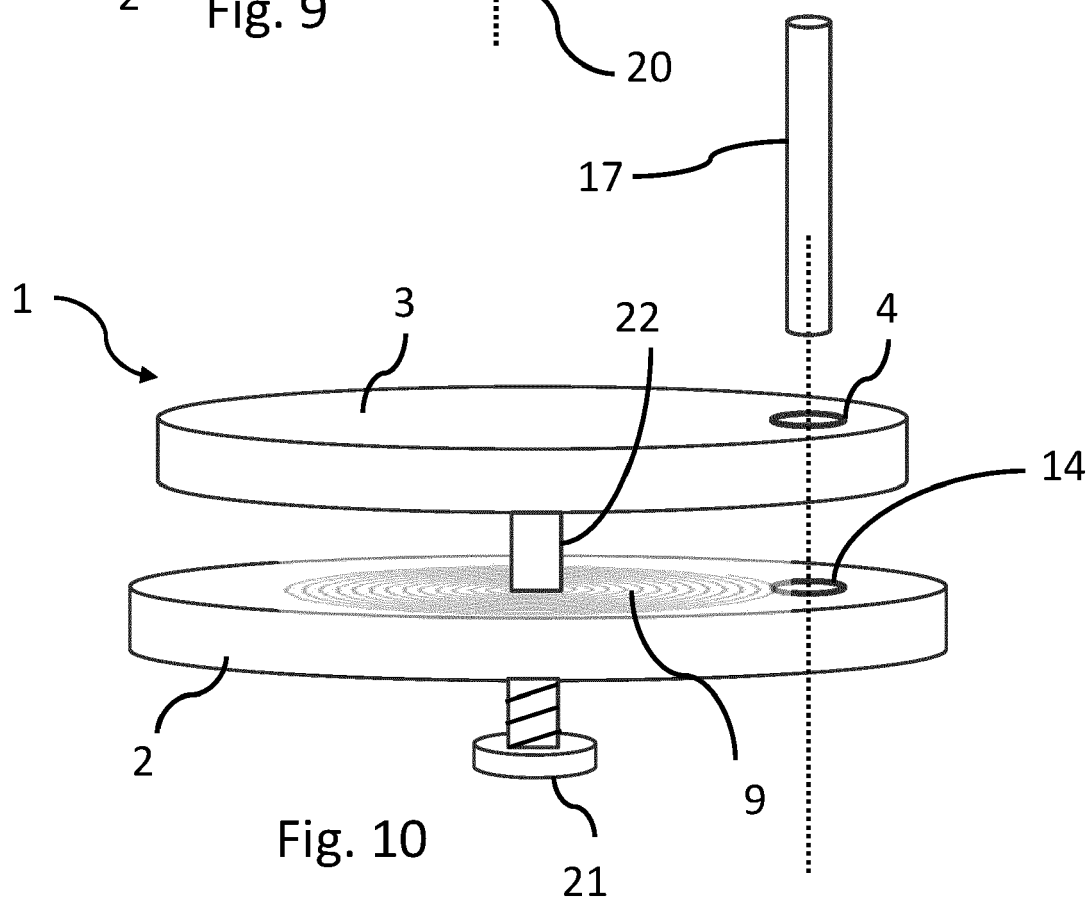
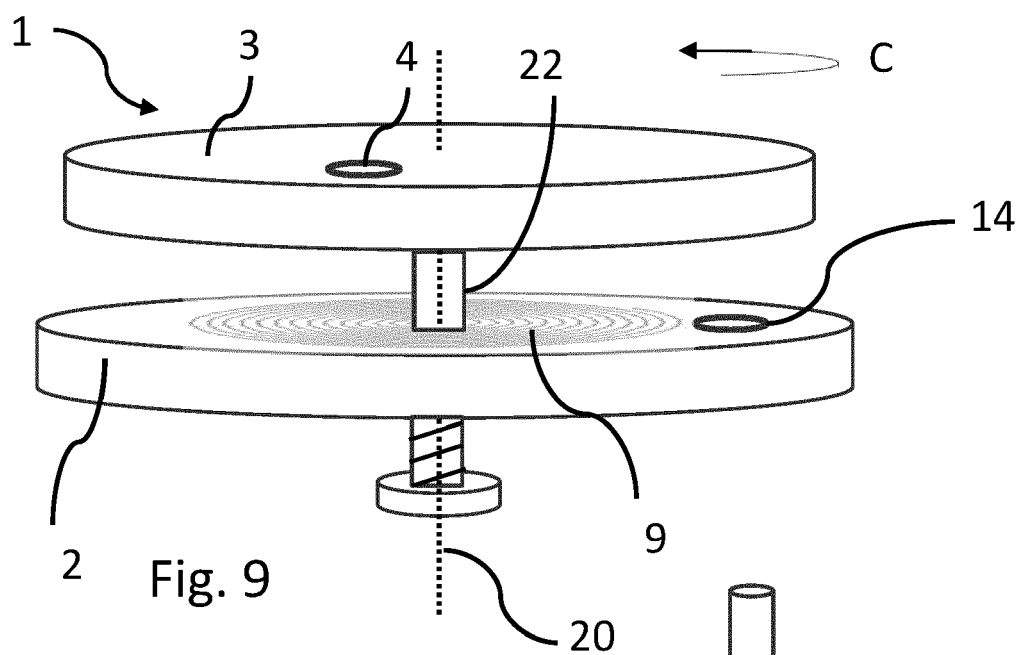


Fig. 8





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Application Number

EP 23 20 3332

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		28 March 2024	Koulo, Anicet
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			

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO.

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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28-03-2024

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

REFERENCES CITED IN THE DESCRIPTION

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