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(54) Title: AN APPLICATOR OF LIQUIDS

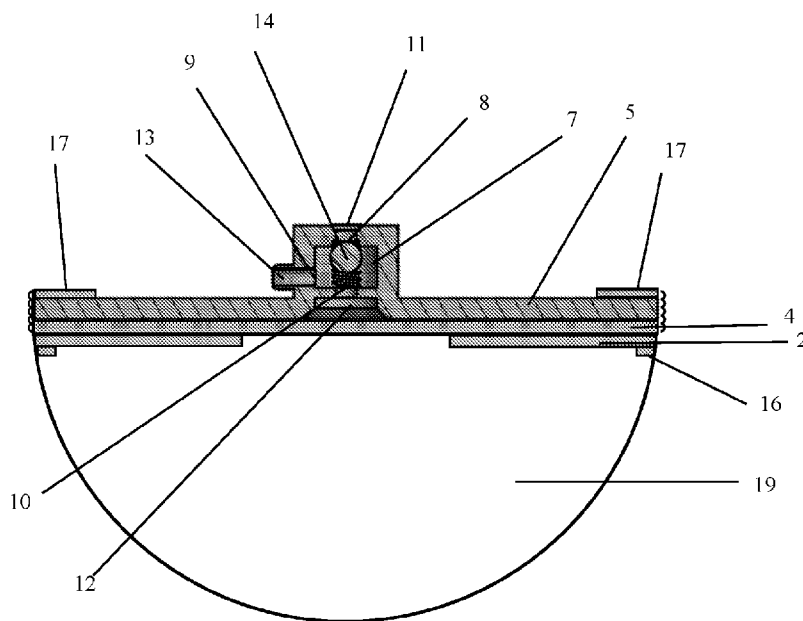


Fig. 7A

(57) Abstract: A device for aromatic dispensing and application of liquids that is portable and wearable, for example on or under clothes anywhere on the body. The applicator of liquids (1) comprises a sandwich structure of a holder (2) with a through opening (3), a flexible flat wall (4) held by the holder (2), and a lid (5) with a through opening (6), wherein the area of the flexible wall (4) is greater than that of the through opening (3) of the holder (2) and also greater than the through opening (6) in the lid (5), and the flexible wall (4) completely covers the through opening (3) in the holder (2) and in the lid (5) as well. The area of the lid (5) is greater than that of the through opening (3) of the holder (2). Upon filling the applicator with liquid, pressure is exerted on the flexible flat wall (4), which then expands similarly to a balloon and is pressed through the opening (3) of the holder (2), thus forming a pocket filled with liquid.

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An applicator of liquids

Field of Technology

Application of liquids, in particular aromatic liquids, a mobile portable applicator

State of the Art

Nowadays, a number of mechanisms are used for the application of liquids, starting with various droppers, spray valves that are today widely used for the application of perfumes, up to pressure spray diffusers containing a liquid or aerosol that are currently used for industrial or cosmetic applications, such as those of spray paint products, hair spray or deodorants.

Automatic air fresheners powered either from the mains or by an attached battery, that either continuously or intermittently automatically release the aromatic content of their containers can be regarded as automatic applicators of liquids or aerosols. Air fresheners often use a little motor for its operation that mechanically compresses the valve releasing aromatic substances into the environment. Utilization of such a little motor increases the applicator energy demands, and/or the battery capacity and size, thus effecting the weight of the applicator. Available on the market are air fresheners that do not comprise a little motor, but an electromagnetically operated valve connected directly to the container filled with aerosol. On the other hand, the used electromagnetically operated valves usually have high energy demands.

Currently, the overwhelming majority of air fresheners are designed for disposable containers, meaning that the container is used up, discarded and replaced by a new full one. Such consumption-oriented approaches have a non-negligible impact on the environment.

However, currently there is no sufficiently small, automatic and mobile applicator of liquids available on the market which could carry a sufficient amount of liquid, which could do without an energy-demanding mechanism required for the displacement of liquid from the container, which could be replenishable, and which could be attached onto the body or clothes.

Description of the Invention

A mobile, replenishable applicator of liquids has been constructed that is, due to its simple design, small, light-weight and that, due to its design, can release liquids with a minimum energy consumed, where the applicator is operated either manually, or automatically, and the entire power supply of the applicator consists of a small, light-weight battery. The applicator is primarily intended for dispensing perfumes or Cologne water, but it can also be used, for example, to dispense liquids with repellent effects on insects or to dispense disinfecting liquids where such liquids are applied at set time intervals in set amounts or as necessary.

The applicator of liquids is preferably fitted with a control board allowing wireless connection between the applicator and electronic devices, such as controllers or mobile telephones.

The main functional component of the applicator is a flat flexible wall, made of expansible material with elastic memory, preferably made of silicone or latex, that works similarly as an inflating balloon or better a balloon for “water bombs”. When the applicator is empty, the flexible wall is flat and stretched in the sandwich structure comprising a holder of the flexible wall with a through opening, the flexible wall, and a lid. The lid is connected to the inlet/outlet chamber fitted with a valve. The surface of the lid is greater than that of the holder through opening and the lid covers the entire area of the holder through opening. The flexible wall holder is fitted with at least one flat wall and the lid is fitted with at least one flat wall as well and these two flat walls hold the flat flexible wall between them. The area of the flexible wall is greater than that of the through opening in the lid and the area of the flexible wall is greater than that of the through opening in the holder; in addition, the flexible wall covers both the through openings – the one in the holder as well as the one in the lid. The only place where the flexible wall may deviate from the sandwich structure is in the point of the through opening of the flexible wall holder. When filling the applicator with liquid through the valve, pressure is exerted on the flexible wall which then expands similarly to a balloon when being filled with water. The flexible wall is then pressed outside from the sandwich structure by the through opening in the flexible wall holder thus making a pocket filled with liquid with the flexible wall that keeps exerting pressure onto the liquid inside the pocket thus pressing the liquid out. If the design of the applicator is concentric as

well, meaning that the filling and discharging portions of the applicator are positioned in the same axis parallel to the direction of the delivery of the liquid from the pocket, the maximum emptying of the applicator is guaranteed. After emptying, the pocket of the flexible wall resumes its original flat shape in the sandwich structure. With the exception of the through opening in the holder, the pocket of the flexible wall has more or less the shape of a sphere. The shape of the filled-up pocket of the flexible wall is given by the vial in which the flexible wall is positioned as it copies the vial during filling.

The sandwich structure is gradually put into the vial that preferably has a risen edge on the inner shell onto which the sandwich structure is put. Thank to this arrangement it is ensured that there is free space in the vial under the sandwich structure that can be utilized by the expanding flexible wall being filled with liquid. At first, the flexible wall holder with a through opening is put into the vial with the flexible wall put onto the through opening. The flexible wall becomes the base for the lid with the inlet/outlet chamber fitted with at least one valve, inlet/outlet opening, filling opening and/or application opening following the valve with the lid firmly attached to the vial and the entire sandwich structure is pressed together, by which sealing is attained.

Another alternative for the implementation of the applicator is the design where the flexible wall holder is firmly fixed on/in the vial, i.e. the vial is closed and is fitted with a through opening of the flexible wall holder. The flexible wall holder is fitted with a flexible wall and a lid.

Another alternative for the implementation of the applicator is the design where the sandwich structure is assembled from a lid with the lower side up where the lid can be a fixed part of the vial. In its bottom, the open vial thus has a through opening in the lid, onto which the flexible wall is placed, followed by the flexible wall holder that is locked in the vial. The vial is covered by the applicator case defining the space for the flexible wall expansion, and the entire applicator is turned upside down.

The applicator of liquids includes an open vial, preferably in the shape of a cylinder opened on one end with a sectional rim, that is covered by a sandwich structure or that directly includes part of the sandwich structure. The sandwich structure thus comprises a flexible wall holder, flexible wall, and lid, wherein the flexible wall holder shape preferably copies that of the vial opening and is freely inserted in the sectional rim of the vial. The flexible wall holder

is fitted with a through opening that is preferably centred in the holder and preferably has a circular shape. The size of the through opening cross section depends on the expansion of the flexible wall; preferably, the through opening area is 3 to 12 times smaller than that of the flexible wall holder. The flexible wall holder is fitted with a flat flexible wall, the area of which is thus greater than that of the holder through opening and the entire through opening is covered and overlapped by it. Preferably, the overlapping area is at least twice of that of the through opening. The flexible wall is fitted with a lid, the area of which is greater than that of the holder through opening and as in the case of the flexible wall, it covers the entire area of the holder through opening. Preferably, the lid is firmly attached to the vial and preferably, the lid has at least the same area as that of the flexible wall is. Preferably, the shape and size of the lid copies at least the shape and size of the flexible wall. Preferably, the shape of the lid copies that of the holder. The lid is fitted with a through opening positioned in the space above the through opening of the flexible wall holder and covered by the inlet/outlet chamber. Preferably, the through opening in the lid is smaller than that of the flexible wall holder. Preferably, the centre of the holder through opening, the centre of the lid through opening, and the centre of the inlet/outlet chamber are aligned in one axis. The area of the lid through opening is preferably at least 3 times smaller than that of the through opening of the flexible wall holder. The functional sandwich structure is pressed together and due to the flat walls that closely fit, it is sealed. The compression is preferably given by the compatibility of the vial, the flexible wall holder, and the lid where the rim of the vial is sectional, includes a risen edge to hold the holder and the lid. Therefore, the vial is firmly fixed to the holder and the lid, preferably in a dismountable manner.

As stated above, the through opening in the lid is followed by the inlet/outlet chamber that is fitted with the inlet/outlet opening, filling opening, and/or application opening. The inlet/outlet opening is intended for supplying the liquid into the pocket of the flexible wall and also for supplying the liquid from the pocket of the flexible wall back to the inlet/outlet chamber. The input/output opening is preferably followed by the input/output line. The input/output line preferably follows the through opening in the lid or passes through it. The inlet/outlet chamber is fitted with at least one valve. Where the valve refers to a filling valve, it is preferably implemented as a spring-loaded spherical valve, a half-ball valve or a different valve with a sealing element. The filling valve is connected to the filling opening. The filling opening is used for filling the applicator with liquid; the filling opening is

preferably followed by a charging line that is open into the outside of the applicator. The inlet/outlet chamber can also be fitted with an application opening that is located in the inlet/outlet chamber away from the pocket of the flexible wall upstream the ball of the valve. Preferably, the parameters of the filling valve and the location of the application opening in the inlet/outlet chamber are selected in order to allow the application opening to be closed by the filling valve ball when the filling valve is opened and the flexible wall being filled. In addition, the liquid can be released from the flexible wall into the application line with the filling valve closed and the applicator being used. The application opening is connected to the application valve, preferably using the application line. The application valve is preferably a ball-type valve for manual operation or an electromagnetic solenoid in the case of an electromagnetically operated applicator.

An alternative design of the applicator allows one two-way valve to be used for both functions, both the filling and the application valve, where the line is adapted for the supply of liquid towards the flexible wall, and/or the filled pocket of the flexible wall, and also for the supply of liquid away from the pocket of the flexible wall.

As mentioned above, if the applicator is filled by liquid, the bulged filled flexible wall tends to recover its original state, i.e. continuously exerts pressure on the liquid thus pressing it back to the inlet/outlet chamber and from here by the application opening and application line towards the application valve. After the application valve is opened, the liquid from the applicator is released without any other energy demands. The continuous pressure of the flexible wall exerted onto the liquid also ensures that the applicator will be emptied to the maximum extent.

The only energy that needs to be expended is required for the opening of the application valve. The application valve is operated either manually, by depressing the valve, by which the passage through the valve is open and the liquid released out of the applicator, and/or the application valve is connected to an electronic control unit, preferably a control board allowing the dispensing process to be set. If the applicator is not operated purely mechanically by hand, it must be fitted with a source of energy, battery, preferably a Li-ion battery. The control board is preset for automatic dispensing at certain time intervals (minutes) and the duration of one application (milliseconds) is preset as well; such settings can be changed either manually directly on the applicator, and/or using a paired electronic device. One of

available options is the connection of the control board with other electronic devices either by a radio transmitter and receiver, or, for example, by Bluetooth technology. Preferably, the applicator comprises LED indicators connected to the control board. Preferably, the applicator comprises a temperature sensor connected to the control board.

The applicator preferably comprises a replaceable absorbent strip that is positioned at the outlet from the outlet valve. The absorbent strip is made of paper, textile or other absorbent material and is intended for capturing the liquid released from the valve and its sustained released or evaporation, where applicable. In particular, if the liquid is aromatic. The absorbent strip can be preferably used for applicators the purpose of which is the application of perfume, Cologne water or insect-repellent liquids.

The entire applicator is preferably fitted in the applicator case that comprises a control board and battery.

As mentioned above, the applicator can be used for dispensing aromatic liquids, such as perfumes or Cologne water. In such a case, it is preferred if the applicator can be attached to clothes or onto the body. The applicator can have the shape of a pendant, bracelet, ring or a hair/tie clip. Alternatively, the applicator can be attached to clothes to remain invisible when worn, for example in a bra or on a petticoat. The applicator is preferably attached to clothes by magnets or pins. The applicator designed for insect-repelling, is preferably in the shape of a pendant or bracelet. If the applicator is used for animals, the applicator can be integrated in the animals' collars or coats where the applicator ensures dispensing of insect repellents at preset intervals or when necessary.

Summary of presented drawings

- Fig. 1: Applicator of liquids
- Fig. 2A: Applicator of liquids, plan view
- Fig. 2B: Applicator of liquids as per Example 3, A-A section, empty
- Fig. 2C: Applicator of liquids as per Example 3, A-A section, full
- Fig. 3: The essential components of the empty applicator as per Example 3
- Fig. 4: The essential component of the full applicator as per Example 3
- Fig. 5A: The lid of the applicator with the filling valve
- Fig. 5B: The lid of the applicator with the filling valve, plan view
- Fig. 6A: The lid of the applicator with the ball-type filling valve, A-A section
- Fig. 6B: The lid of the applicator with the ball-type filling valve, A-A section, detail of the ball-type valve
- Fig. 6C: The lid of the applicator with the ball-type filling valve, A-A section, detail of the ball-type valve
- Fig. 7A: The vial of the applicator of liquids as per Example 2, sectional view
- Fig. 7B: The vial of the applicator of liquids as per Example 2, plan view
- Fig. 8: The applicator of liquids with the lid that is part of the vial, and with one valve, as per Example 4

Examples of Invention Execution

Example 1 – the basic variant, a manually operated valve

The applicator 1 for liquids was manufactured that comprised an open cylindrical vial 19 with the inner diameter of 18 mm, with the thickness of the wall 2 mm, made of plastic material. The vial 19 comprised a sectional edge where the wall of the vial 19 was narrowed at the rim of the vial 19, by which a step – risen edge 16 was created and the inner diameter of the vial 19 was thus extended by 20 mm. The vial 19 had the height of 10 mm to the risen edge 16, where the extension had a height corresponding to that of the sandwich structure 20 comprising the holder 2 of the flexible wall 4, flexible wall 4, and lid 5. The risen edge 16 was fitted with a flat plastic holder 2 of the flexible wall 4, which had a circular shape and a diameter of 20 mm corresponding to the inner diameter of the rim of the vial 19 in the extended portion. The holder 2 of the flexible wall 4 had a centred through opening 3 of the size of 10 mm. Onto the holder 2 of the flexible wall 4, a circular flexible wall 4 with the diameter of 12 mm and the thickness of 0.7 mm, made of silicone, was put and centred. Onto the flexible wall 4, a plastic lid 5 was put, which had the diameter of 15 mm with a through opening 6 of 12 mm fitted with an inlet/outlet chamber 7 with an application opening 9 with the diameter of 1.5 mm, with an inlet/outlet opening 10 with the diameter of 1.5 mm and with a filling opening of 1.5 mm, which was, via the charging line 11 connected with the filling valve 14. The lid 5 was pressed against the vial 19 and fixed using clips. The application opening 9 was followed by the application line 13 with the inner diameter of 1.5 mm, which connected the inlet/outlet chamber 7 with the application valve 14. The application valve 14 was of spring-loaded, mechanical type. The entire applicator was embedded in the case 18 of the applicator 1.

A plastic syringe with no needle, with the capacity of 10 ml filled with disinfecting gel was attached to the charging line 11 supplying the filling valve 14. By the pressure of the liquid coming out of the syringe, the filling ball valve 14 was opened, the liquid flew through the inlet/outlet chamber 7 through the inlet/outlet opening 10 into the input/output line 12, by which the flexible wall 4 started to expand through the through opening 3 in the holder 2 of the flexible wall 4. The flexible wall 4 created a pocket filled with gel the shape of which copied the shape of the vial 19. The volume of the pocket was about 3 ml. After filling was

completed, and/or if the filling valve 14 was no longer exposed to pressure, the filling valve 14 automatically closed. The expanded flexible wall 4 kept pressing the gel into the inlet/outlet chamber 7 and through the application opening 9 via the application line 13 into the application valve 14. For the purpose of application, the application valve 14 was mechanically depressed, which released the liquid from the application valve 14 in the amount corresponding to the duration of the application valve 14 opening. Gel was thus applied directly onto hands after depressing the application valve 14 without the necessity to handle any vial or spray.

Example 2 – a sphere, control board, electromagnetically operated valve

The applicator 1 for liquids was manufactured that comprised an open vial 19 in the shape of a hemisphere with the inner diameter of 30 mm, with the thickness of the wall 1 mm, made of light-weight steel. The vial 19 comprised on its rim of a hem – risen edge 16, wherein the hem was present along the entire inner perimeter of the vial 19 in the depth from the opened rim of the vial 19 corresponding to the height of the sandwich structure 20 comprising a metal holder 2 of the flexible wall 4, silicone-based flexible wall 4, and metal lid 5, and the hem protruded 1 mm into the vial 19. In addition, the vial 19 comprised two more functional hems 17 positioned one against the other on the rim of the vial 19 flush with the rim of the vial 19, and an external thread (Fig. 7). The hem – risen edge 16 was fitted with a flat holder 2 of the flexible wall 4, which was of a circular shape with two cut off ends corresponding by their shapes and sizes to the functional hems 17, and the holder 2 of the flexible wall 4 had the thickness of 1 mm and the diameter 30 mm. The holder 2 of the flexible wall 4 had a centred through opening 3 of the size of 7 mm. Onto the holder 2 of the flexible wall 4, a flat circular flexible wall 4 with the diameter of 30 mm and the thickness of 1.5 mm, made of silicone, was put and centred. Onto the flexible wall 4, a plastic lid 5 of a circular shape with two cut off ends corresponding by their shapes and sizes to the functional hems 17 was put, which had the diameter of 30 mm and the thickness of 2 mm with a through opening 6 of 3 mm fitted with an inlet/outlet chamber 7 with an application opening 9 with the diameter of 1 mm, with an inlet/outlet opening 10 with the diameter of 1.5 mm and with the filling opening of 1 mm, which was, via the charging line 11 connected with the filling valve 14. The lid 5 was depressed against the vial 19 and turned a little, by which the lid 5 got seized under the functional hems 17 and sealed the entire sandwich structure 20. The application opening 9 was followed by the application line 13 with the inner diameter of

1 mm, which connected the inlet/outlet chamber 7 with the application valve 14. The application valve 14 was of electromagnetically operated type. To a half-round vial 19, a half-round case 18 of the applicator 1 was screwed using an external thread, which comprised a opening for leading out the application valve 14 and a control board that controlled the electromagnetically operated application valve 14, and a Li-ion battery with the capacity of 3.6 V.

To fill the applicator 1, the case 18 of the applicator 1 was unscrewed and a plastic syringe with no needle with the volume of 10 ml filled with aromatic liquid was put onto the charging line 11 leading to the filling valve 14. By the pressure of the liquid coming out of the syringe, the filling ball valve 14 was opened, the liquid flew through the inlet/outlet chamber 7 through the inlet/outlet opening 10 into the input/output line 12, and the flexible wall 4 started to expand through the through opening 3 in the holder 2 of the flexible wall 4. The flexible wall 4 created a pocket filled with aromatic liquid, the shape of which copied the shape of the vial 19. The volume of the pocket was about 6 ml. After filling was completed, and/or if the filling valve 14 was no longer exposed to pressure, the filling valve 14 automatically closed. The vial 19 was again covered by the screwed on case 18 of the applicator 1. The expanded flexible wall 4 kept pressing the aromatic liquid into the inlet/outlet chamber 7 and through the application opening 9 via the application line 13 into the electromagnetically operated application valve 14. The application of the aromatic liquid was controlled by the control board where at preset time intervals, the electromagnetically operated valve 14 was activated and opened and the aromatic liquid released from the applicator 1.

The case 18 of the applicator 1 as well as the vial 19 can be fitted with a fastener and decorations where it is possible to use the applicator 1 as a functional piece of jewellery. The vial 19 and the case 18 of the applicator 1 can have various shapes and can be used as bracelets, pendants or hair clips.

Example 3 – a control board, electromagnetically operated valve

The applicator 1 for liquids was manufactured that comprised an open cylindrical vial 19 with the inner diameter of 33 mm, with the thickness of the wall 1.5 mm, made of metal. The vial 19 comprised a sectional edge where the wall of the vial 19 was narrowed on the rim, by which a step – risen edge 16 was created and the inner diameter of the vial 19 was thus extended by 35 mm. The vial 19 had the height of 15 mm to the risen edge 16, where the extension had the height of 2.5 mm corresponding to that of the sandwich structure 20

comprising the metal holder 2 of the flexible wall 4, silicone-based flexible wall 4, and metal lid 5. The risen edge 16 was fitted with a holder 2 of the flexible wall 4 with the thickness of 1 mm, which had a circular shape and a diameter of 35 mm corresponding to the inner diameter of the rim of the vial 19 in the extended portion. The holder 2 of the flexible wall 4 had on the side adjacent to the flexible wall 4 a flat wall; on the other side, the wall of the holder 2 was bulged. The holder 2 of the flexible wall 4 had a centred through opening 3 of the size of 10 mm. Onto the holder 2 of the flexible wall 4, a circular flat flexible wall 4 with the diameter of 30 mm and the thickness of 1.5 mm, made of silicone, was put and centred. Onto the flexible wall 4, a plastic lid 5 was put, which had the diameter of 35 mm with a through opening 6 of 3 mm fitted with an inlet/outlet chamber 7 with an application opening 9 with the diameter of 1 mm, with an inlet/outlet opening 10 with the diameter of 0.8 mm and with the filling opening of 1 mm, which was, via the charging line 11 connected with the filling valve 14. The lid 5 had on the side adjacent to the flexible wall 4 a flat wall; on the other side, the wall of the lid 5 was bulged. The lid 5 was pressed against the vial 19 and fixed using the case 18 of the applicator 1. The application opening 9 was followed by the application line 13 with the inner diameter of 1 mm, which connected the inlet/outlet chamber 7 with the application valve 14. The application valve 14 was of electromagnetically operated type, controlled by a control board located in the case 18 of the applicator 1 together with a battery. On the nozzle of the application valve 14, an absorbent strip made of textile can be fixed to absorb the liquid and provide its sustained evaporating.

A plastic syringe with no needle, with the capacity of 20 ml filled with liquid insect-repellent was attached to the charging line 11 supplying the filling valve 14. By the pressure of the liquid coming out of the syringe, the filling ball valve 14 was opened, the liquid flew through the inlet/outlet chamber 7 through the inlet/outlet opening 10 into the input/output line 12, and the flexible wall 4 started to expand through the through opening 3 in the holder 2 of the flexible wall 4. The flexible wall 4 created a pocket filled with insect-repellent, the shape of which copied the shape of the vial 19. The volume of the pocket was about 14 ml. After filling was completed, and/or if the filling valve 14 was no longer exposed to pressure, the filling valve 14 automatically closed. The expanded flexible wall 4 kept pressing the insect-repellent into the inlet/outlet chamber 7 and through the application opening 9 via the application line 13 into the application valve 14. The application of the insect-repellent was controlled by the control board where the control board comprised a digital transmitter and receiver and was connected to a mobile application. In addition, the control board comprised a temperature sensor and connection of a distance sensor located in the vial of

the applicator 1 that responded to changes in the volume of the pocket of the flexible wall 4. The control board, at preset time intervals or based on the commands from the mobile application, activated and opened the electromagnetically operated application valve 14 and the insect-repellent was released from the applicator 1. The quantity of released liquid depends on the duration of the electromagnetically operated application valve 14. If an absorbent strip is placed on the application valve 14, the released insect-repellent is absorbed by the absorbent strip and is slowly evaporated from it. The applicator 1 is then preferably positioned for example in a tent and remotely activated by the mobile application wherein the tent is kept without insects. Preferably, the applicator 1 can be positioned on an animal's collar where the insect-repellent, dispensed at regular intervals, keeps the animal free of insects. Also preferably, the applicator 1 can be positioned on clothes or on a rucksack when camping with preset time intervals for application.

Example 4 – one manually operated valve, the lid integrated in the vial

The applicator 1 for liquids was manufactured that comprised an open block-type vial 19 with the inner diameter of 50 x 30 x 15 mm, with the thickness of the wall 1 mm, made of steel. At its bottom, the vial 19 comprised a through opening 6 of the lid 5 with the diameter of 0.5 cm, as the entire bottom of the vial 19 was part of the lid 5. On the external side the vial, the lid 5 was fitted with the inlet/outlet chamber 7 with a simple two-way valve 14 of mechanical type fitted with a mechanical opening system – a pin connected to the valve by a screw cap. In addition, the inlet/outlet chamber 7 comprised the filling opening 8 leading from the outer side of the applicator 1 into its core, and an inlet/outlet opening 10 leading from the inlet/outlet chamber 7 towards the flexible wall 4. Onto the lid 5, in the space of the vial 19, a flat circular flexible wall made of latex, with the thickness of 1 mm and with the diameter of 1.5 cm was placed to overlap the through opening 6 of the lid 5. Onto the flexible wall 4, a flat holder 2 of the flexible wall 4 of the rectangular shape was put, the dimensions of which copied the dimensions of the vial 19, meaning 50 x 30 mm. The holder 2 comprised a circular through opening 3 with the centre placed in one axis with the centre of the flexible wall 4 and with the centre of the through opening 6 of the lid 5. The through opening 3 of the holder 2 had a diameter of 1 cm. The holder 2 was depressed against the flexible wall 4 and the lid 5 and secured by locking catches representing the risen edge 16, from the inner side of the vial 19. The open rim of the vial 19 was overlapped by the case 18 of the applicator 1.

The screw cap was unscrewed from the pin of the mechanical opening system of the valve 14. A plastic syringe with no needle with the volume of 30 ml filled with aromatic liquid was put onto the pin of the mechanical opening system of the valve 14, and/or the filling opening 8 leading to the valve 14. By the pressure of the liquid coming out of the syringe, the mechanical valve 14 was opened, the liquid flew through the inlet/outlet chamber 7 through the inlet/outlet opening 10 towards the flexible wall 4, by which the flexible wall 4 started to expand through the through opening 3 in the holder 2 of the flexible wall 4. The flexible wall 4 created a pocket filled with aromatic liquid, the shape of which copied the shape of the vial 19. The volume of the pocket was about 25 ml. After filling was completed, and/or if the valve 14 was no longer exposed to pressure, the valve 14 automatically closed. The expanded flexible wall 4 kept pressing the aromatic liquid back to the inlet/outlet chamber 7. The cap was screwed back on the pin of the mechanical opening system of the valve 14. To apply the aromatic liquid, the pin, or application valve 14 where applicable was mechanically depressed, which released the liquid from the valve 14 in the amount corresponding to the duration of the valve 14 opening.

List of marks for terms

1. Applicator of liquids
2. Holder of the flexible wall 4
3. Through opening of the holder 2
4. Flexible wall
5. Lid
6. Through opening of the lid 5
7. Inlet/outlet chamber
8. Filling opening of the chamber 7
9. Application opening of the chamber 7
10. Inlet/outlet opening of the chamber 7
11. Charging line
12. Input/output line
13. Application line
14. Valve
16. Risen edge
17. Functional hem
18. Applicator case 1
19. Vial
20. Sandwich structure
21. Axis of the sandwich structure 20

Applicability in Industry

Application of aromatic or functional liquids, discrete application of perfume and Cologne water, application of insect repellents onto humans as well as animals, application of disinfecting liquids.

CLAIMS

1. An applicator (1) of liquids characterized in that it comprises a holder (2) of a flexible wall (4), a flexible wall (4) and a lid (5) connected to an inlet/outlet chamber (7), which comprises at least one valve (14), an inlet/outlet opening (10), a filling opening (8), and/or an application opening (9) connected to the valve (14), wherein the holder (2) of the flexible wall (4) comprises at least one flat wall and a through opening (3), the lid (5) comprises a through opening (6) and at least one flat wall, wherein the flat wall of the holder (2) is adjacent to the flexible wall (4) on one its side and the flat wall of the lid (5) is adjacent to the flexible wall (4) on its other side, the flexible wall (4) is made of elastic material with shape memory and its area is greater than an area of the through opening (3) of the holder (2) and an area of the flexible wall (4) is greater than an area of the through opening (6) of the lid (5) and the flexible wall covers both the through openings (3,6), wherein an area of the lid (5) is greater than an area of the through opening (3) of the holder (2) and the lid (5) covers the entire area of the through opening (3) of the holder (2) .
2. The applicator (1) of liquids according to claim 1 characterized in that the area of the lid (5) is at least of the same size as the area of the flexible wall (4).
3. The applicator (1) of liquids according to claim 1 characterized in that the area of the through opening (6) of the lid (5) is smaller than the area of the through opening (3) of the holder (2) of the flexible wall (4).
4. The applicator (1) of liquids according to claim 1 characterized in that it comprises two valves (14), wherein one of the valves (14) is of application type and the other one of the valves (14) is of filling type.
5. The applicator (1) of liquids according to claim 1 characterized in that one of the valves (14) is of filling type.
6. The applicator (1) of liquids according to claim 4 or 5 characterized in that the filling type valve (14) is ball-type.

7. The applicator (1) of liquids according to claim 1 characterized in that the application opening (9) is connected to the application type opening valve (14) by an application line (13).
8. The applicator (1) of liquids according to claim 64 characterized in that the application type valve (14) is electromagnetically operated.
9. The applicator (1) of liquids according to claim 1 characterized in that the flexible wall (4) is made of silicone or latex.
10. The applicator (1) of liquids according to claim 1 characterized in that the holder (2) of the flexible wall (4), the flexible wall (4), and the lid (5) are positioned on/in a vial (19).
11. The applicator (1) of liquids according to claim 1 characterized in that it is covered by a case (18) of the applicator (1).
12. The applicator (1) of liquids according to claim 4 or 7 characterized in that the application type valve (14) is connected to a battery.
13. The applicator (1) of liquids according to claim 4 or 7 characterized in that the application type valve (14) is connected to a control board.
14. The applicator (1) of liquids according to claim 1 or 12 characterized in that it comprises a sensor(s) connected to a control board.
15. The applicator (1) of liquids according to claim 1 or 11 characterized in that the case (18) of the applicator (1) had the shape of a piece of jewellery.
16. Use of the applicator (1) according to claim 1 for the application of aromatic liquids or gels.

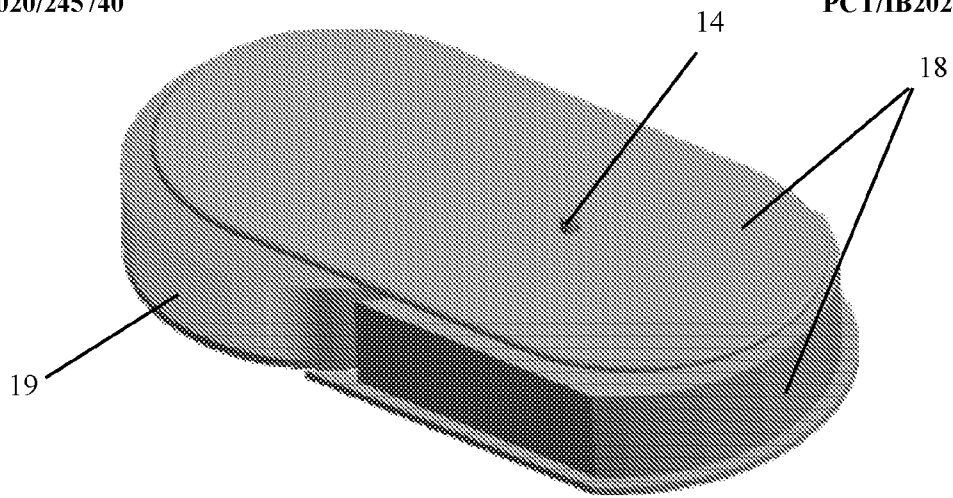


Fig. 1

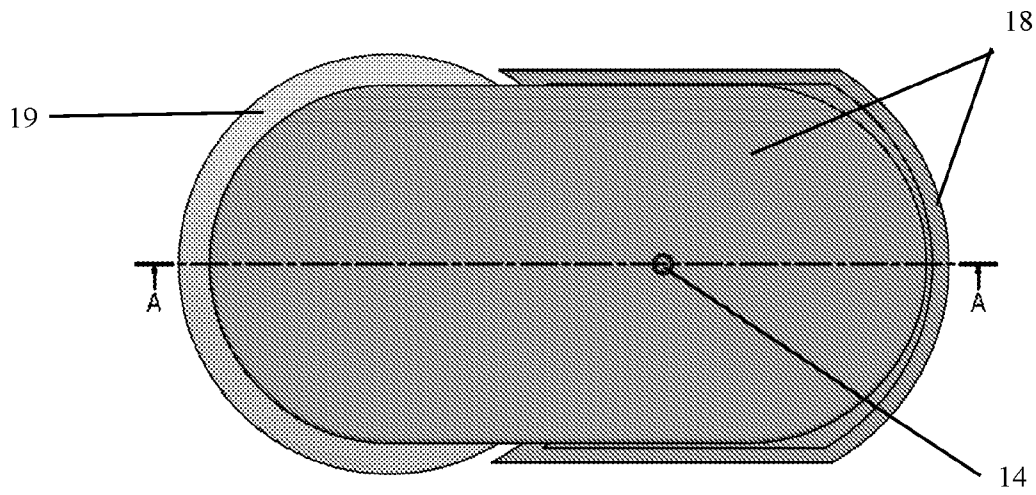


Fig. 2A

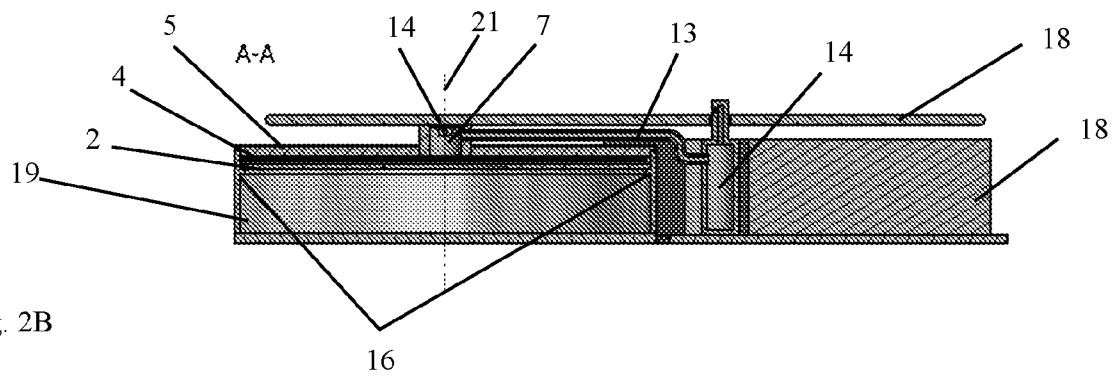


Fig. 2B

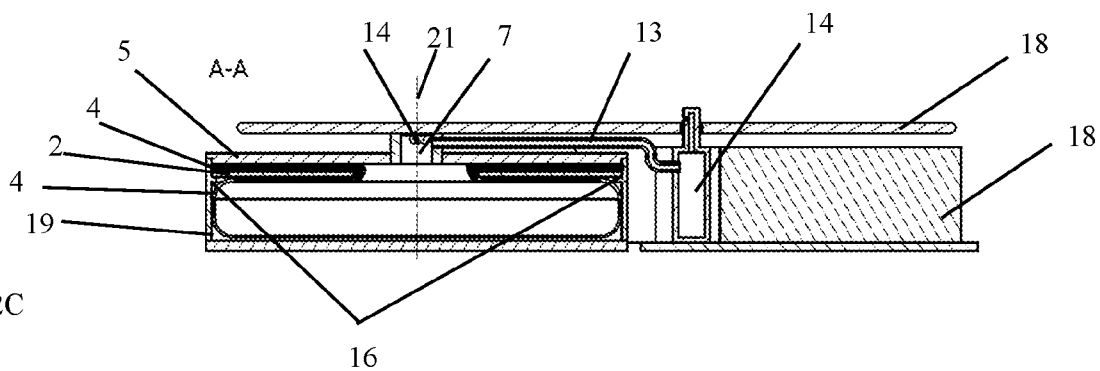


Fig. 2C

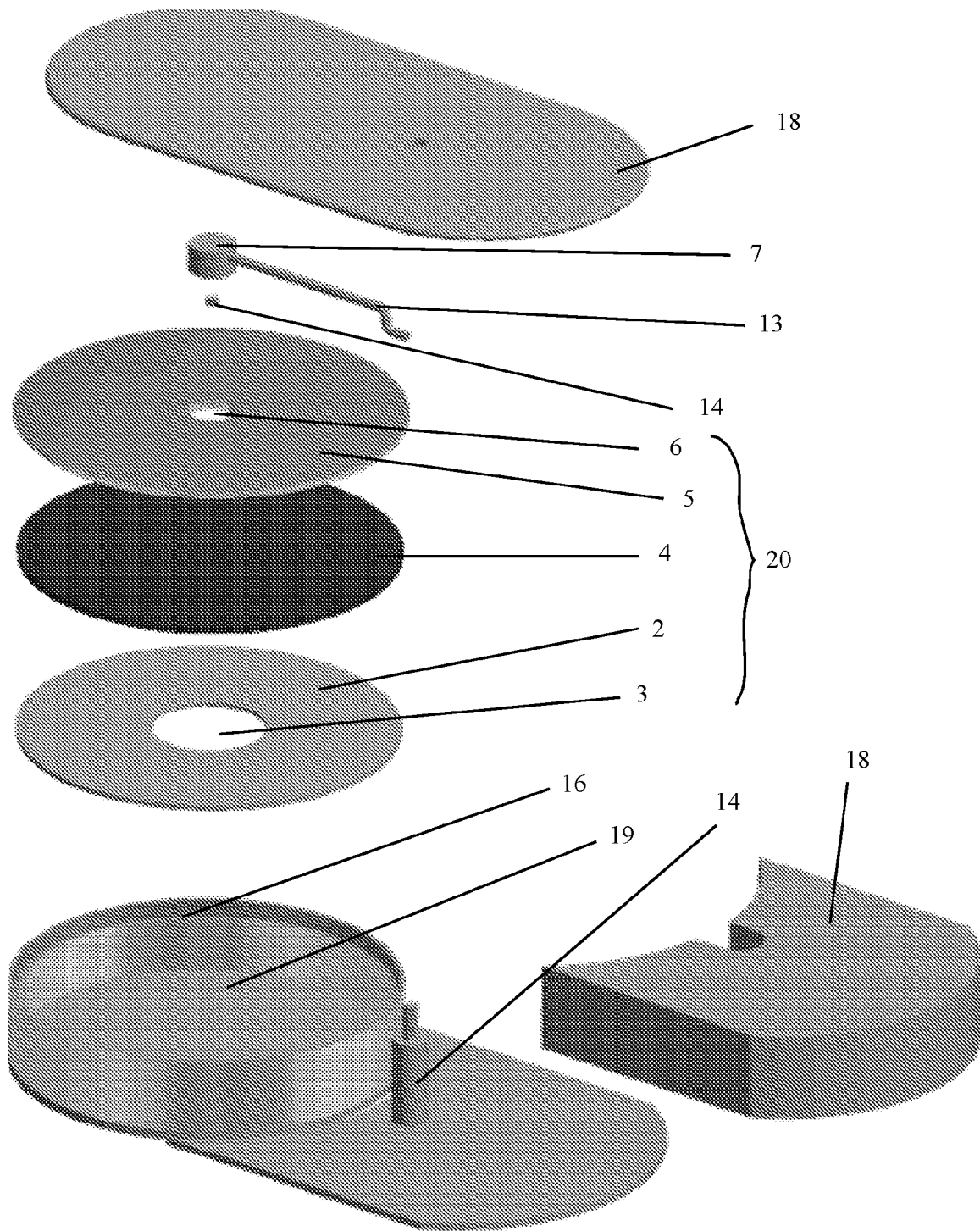


Fig. 3

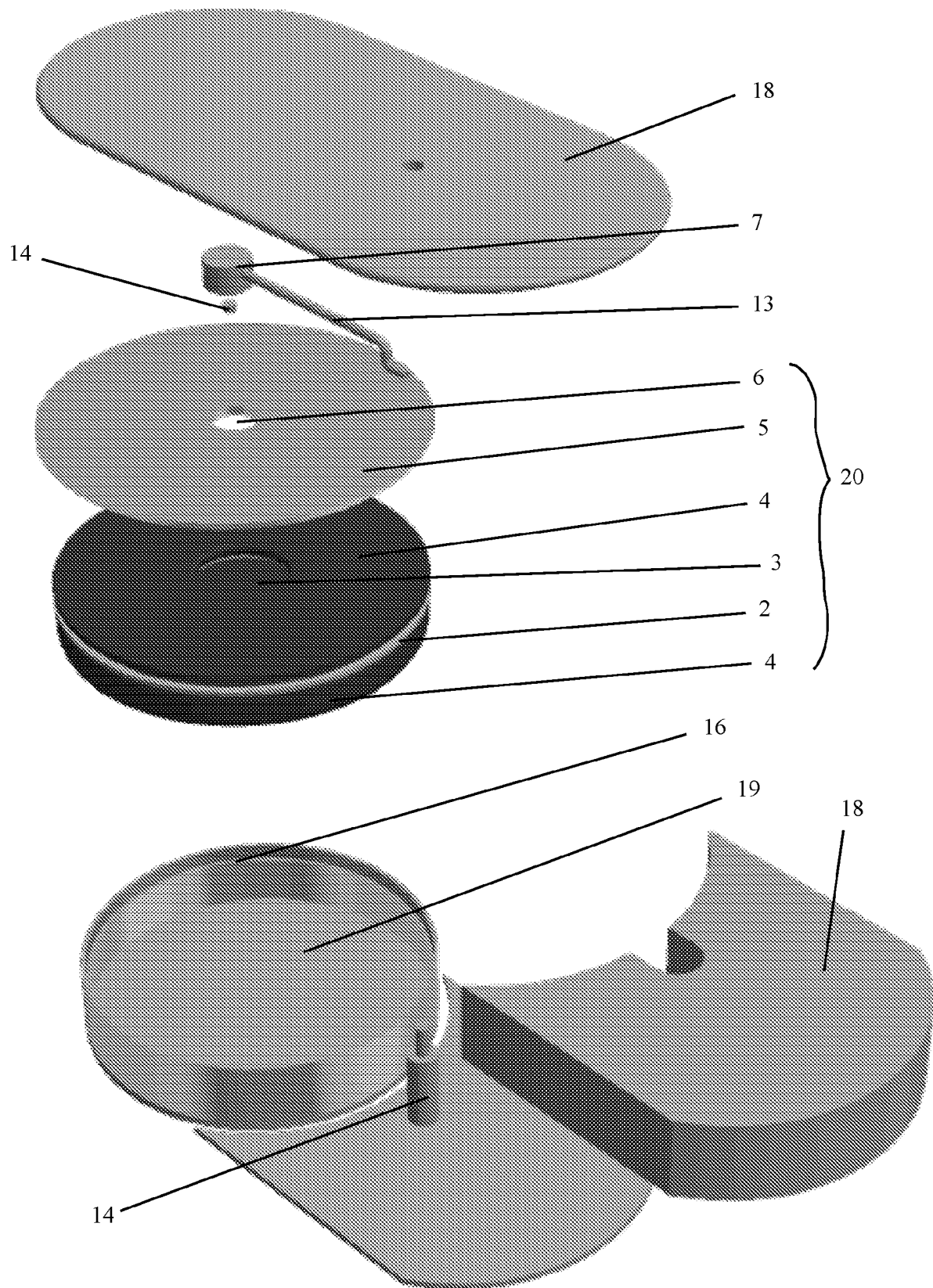


Fig. 4

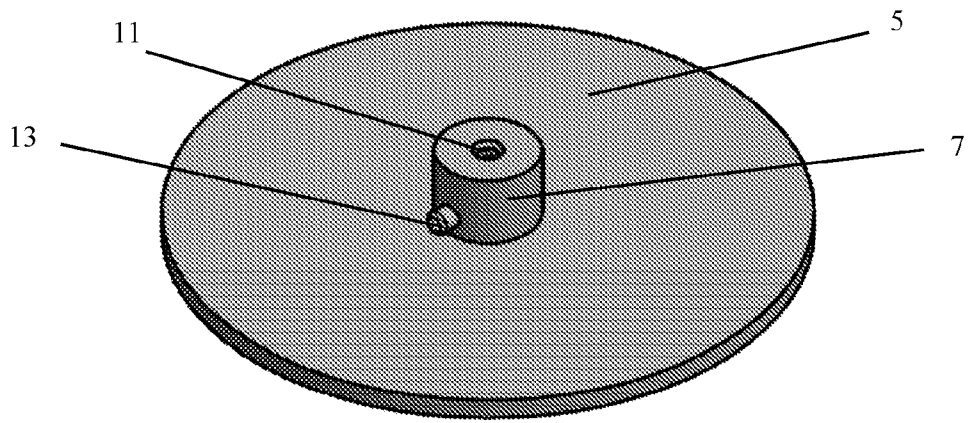


Fig. 5A

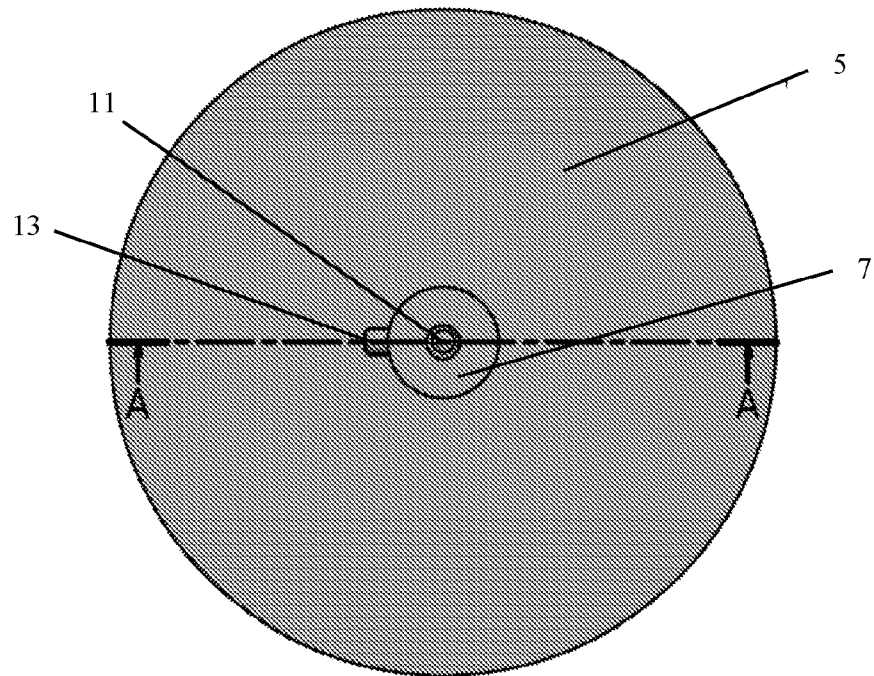


Fig. 5B

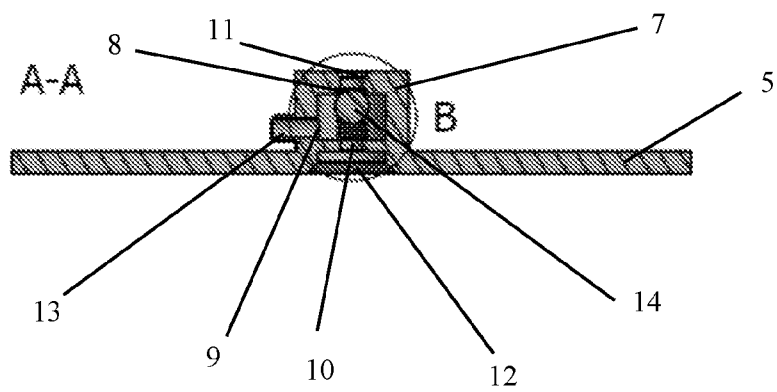


Fig. 6A

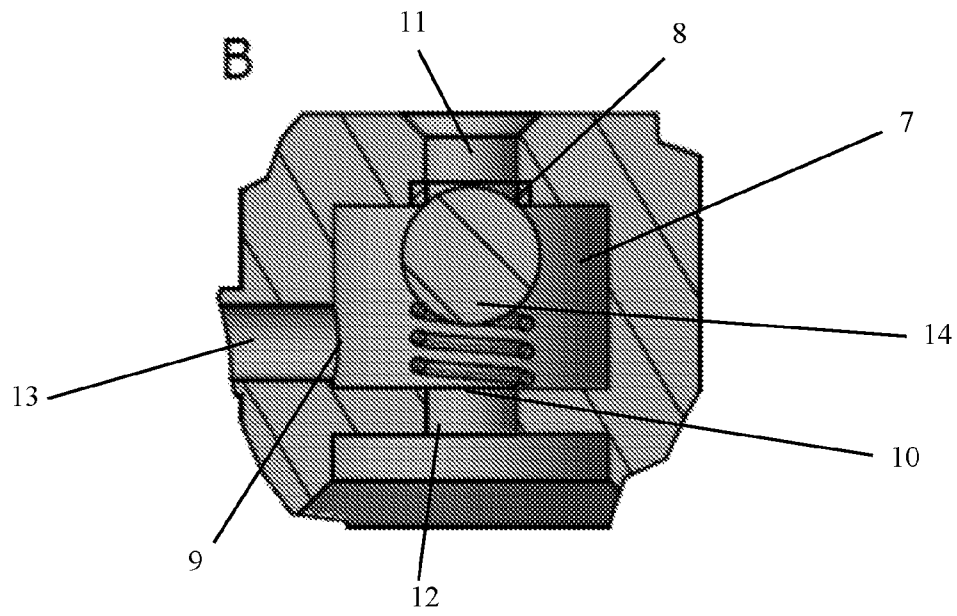


Fig. 6B

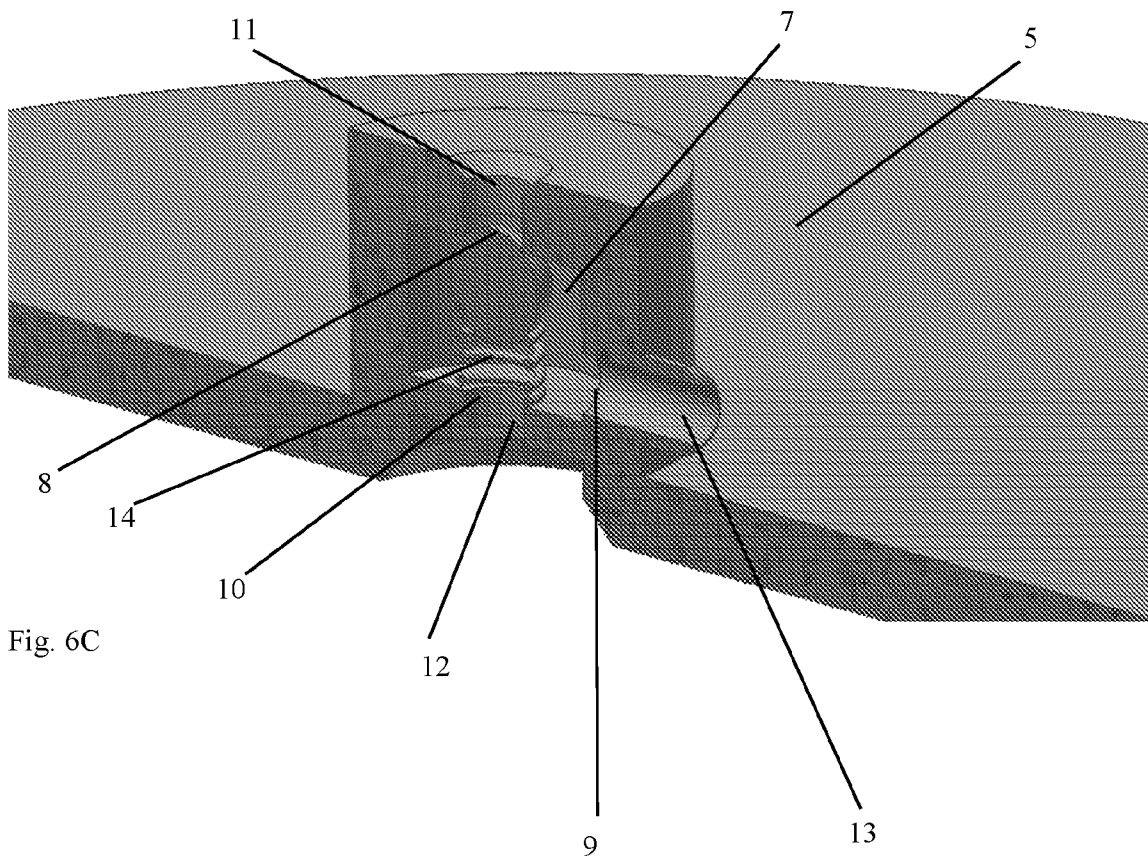


Fig. 6C

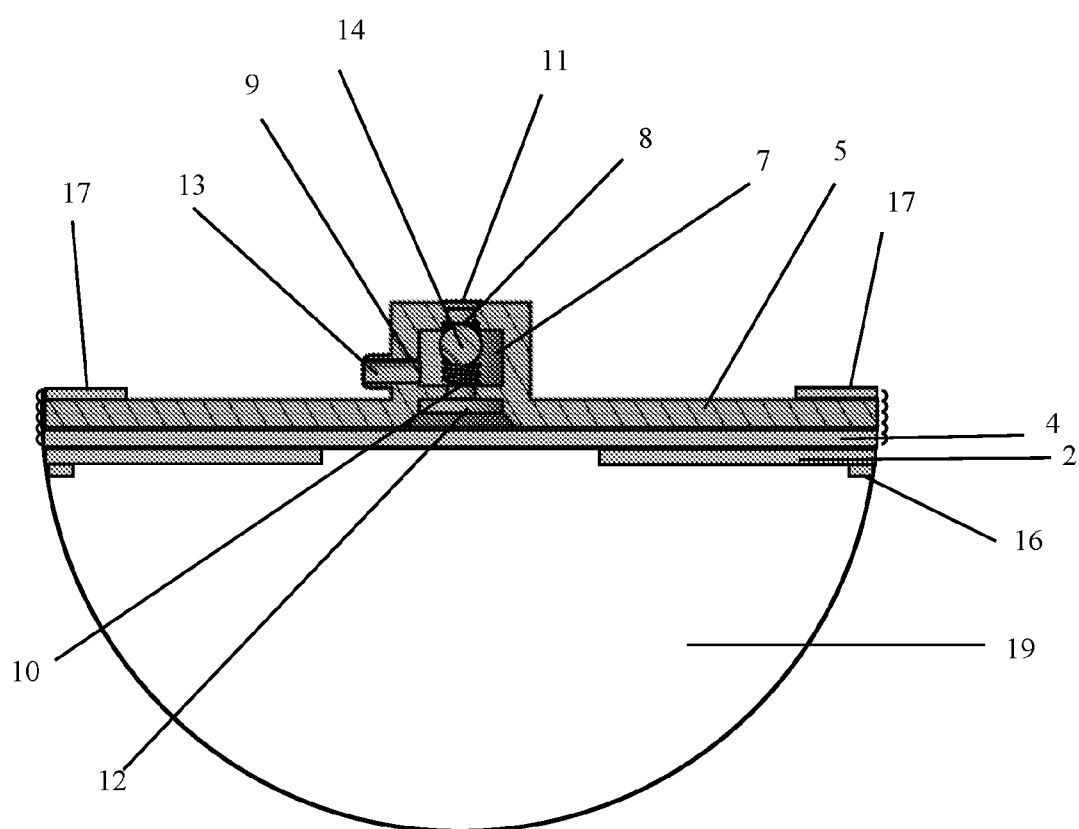


Fig. 7A

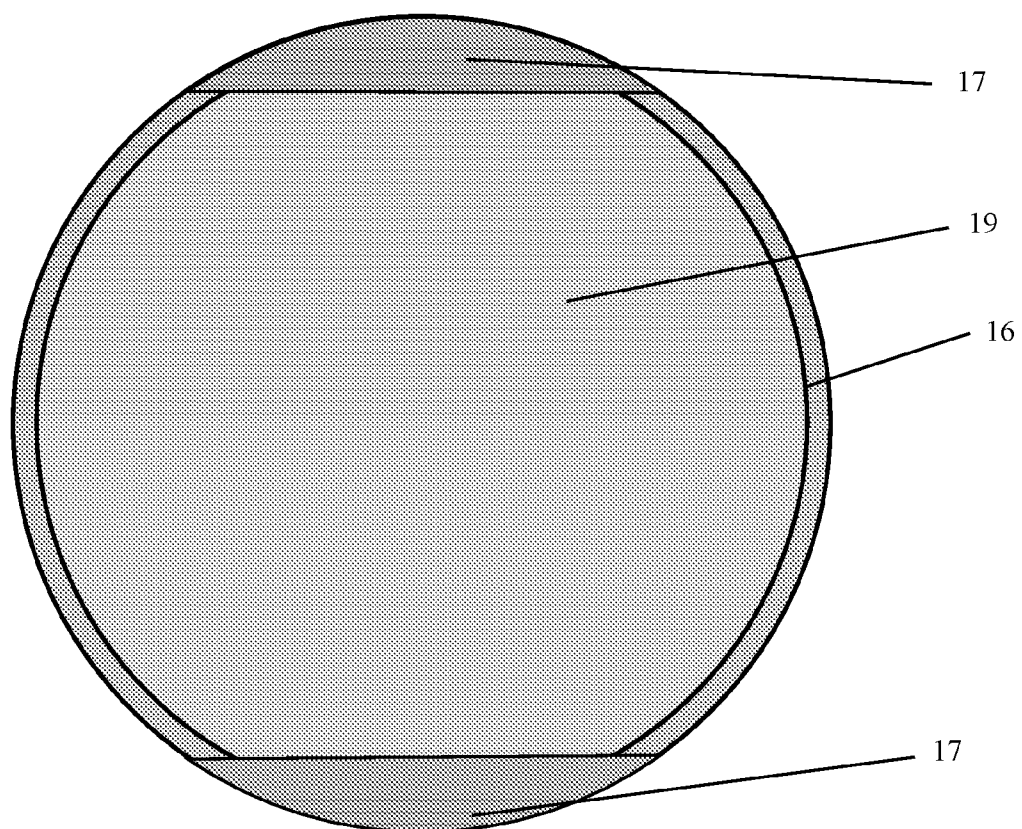


Fig. 7B

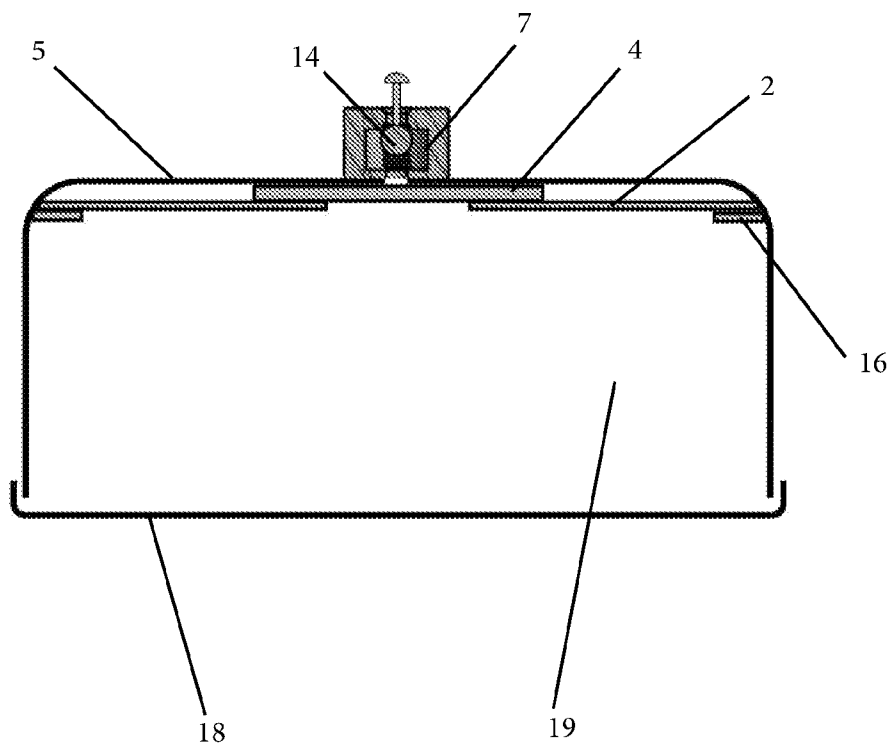


Fig. 8

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2020/055234

A. CLASSIFICATION OF SUBJECT MATTER INV. A61L2/18 B05C17/005 A61L9/12 A45D34/02 B65D83/00 A44C15/00 B05B11/04 A61L2/00 A61L9/04 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) A61L B05C A45F A45D B65D A44C B05B		
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 2015/307258 A1 (HAR-SHAI GADI [IL] ET AL) 29 October 2015 (2015-10-29) paragraphs [0002], [0147], [0219], [0221], [0224], [0225], [0226], [0227], [0230]; figures 3A,3B,3C,3D,4 -----	1-16
X	WO 2018/134816 A1 (GREENSPENSE LTD [IL]) 26 July 2018 (2018-07-26) page 1, line 4 - line 7 page 6, line 26 - page 7, line 15; figures 1,2A,5A,5B,6 page 7, line 17 - page 8, line 2 page 8, line 12 - line 19 page 8, line 20 - line 32 page 9, line 19 - line 34 ----- -/-	1-16
☒ 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 21 September 2020		Date of mailing of the international search report 05/10/2020
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016		Authorized officer Beckmann, Oliver

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2020/055234

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 380 348 A1 (JEDNOTNE ZEMEDELSKE DRUZSTVO [CS]) 1 August 1990 (1990-08-01) column 2, line 16 - column 3, line 38; figures 1-3 column 1, line 2 - line 16 -----	1-16

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Information on patent family members

International application No

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