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DEVICE FOR PRESERVING FOODS

Description

[0001] The invention concerns a device for preserving foods with the aid of a protective gas, in particular with the aid of an inert gas.

[0002] In this connection experts in the field refer to MAP packaging (Modified Atmosphere Packaging = MAP).

[0003] In the context of the invention a food container is to be understood to mean any container which serves to contain solid or fluid foods like, for instance, cans, pouches, bags, jars und the like.

[0004] A device for preserving foods is, for example, to be seen in EP 1145640 A1. It serves to fill the volume of the gas-tight sealed food container with an inert gas, in particular carbon dioxide (CO_2), for example, whereby the air present in the container must simultaneously escape. During this flushing process, inert gas is introduced via an inlet valve, whereby air simultaneously exits via a separate outlet valve. The foods stored in the food container are situated in a protective atmosphere after the flushing process, such that the shelf life is significantly improved.

[0005] Further varied configurations for the preservation of food are described in the documents WO 97/17269 A, JP 09009938 A, JP 11225722 A, FR-A-2802270, US-A-4181146, WO 2007/131683 A, JP 10033388 A, EP-A-0471611, DE 10348119 A1, CA-A1-2104741, DE 102005063300 A1, EP-A-1900649, CA-A1-2037495 and US-A-4055931.

[0006] The gas inlet valve and the gas outlet valve in such devices are usually firmly attached to the food container or integrated therein, for instance in a side wall of the container or in the lid. This has the disadvantage that the valves can easily become dirty or blocked during normal household use. Arrangements therefore need to be made to allow dismantling and disassembly of the valves in a simple manner in order to simplify cleaning. Another problem with the valves is the seal, since the valve seals are usually subject to a high degree of wear and tear, particularly when subjected to frequent temperature fluctuations, as is the case for food containers, since storage can be at room temperature and also at cooler

temperatures, for instance in the fridge or in the freezer, but contact with extremely high temperatures, and in particular with boiling water, is also possible.

[0007] The invention is directed to enabling use of MAP packaging also in the household and in the small-scale catering trade and to providing the corresponding components of a complete concept which permits the customer to guarantee preservation of the freshness and quality of foodstuffs without great effort. Each time the packaging is opened it should be possible to flush it with, or provide it with, protective gas quickly and easily after re-sealing, thus allowing the food to be stored in an optimal atmosphere.

[0008] Among other things, a simple and handy device is to be created which is distinguished by its ease of use and whichfulfils household requirements. The device is to be designed for multiple flushing processes without the need for constant exchange of the gas cartridges or similar. Furthermore, safety-related problems connected to the storage of gas under high pressure are to be avoided.

[0009] Conventional devices are to be improved such that the constructional complexity, in particular of the inlet and the outlet valve, isreduced and that the possibility is provided for cleaning the valves in a simple manner and/or replacing parts subject to wear, such as seals.

[0010] In order to solve this problem, according to the present invention a device is provided for preserving food with the aid of a protective gas, including at least one console comprising a gas storage container, a handheld device connected to the console by means of at least one flexible conduit, in particular a pressure hose, and a gas-tight, sealable food container, wherein the handheld device is provided for connecting the gas storage container to a valve unit of the food container, and the valve unit comprises an inlet valve and an outlet valve.

[0011] The console consists of a housing in which one or multiple gas bottles are arranged next to each other or one above the other. Preferably there are at least two gas storage containers, in particular gas cylinders, arranged in the console, which preferably contain gas mixtures which are different from each other and which are connected to the handheld device via a selector valve. Examples of gas storage containers that can be used are gas bottles, in particular so-called small bottles with a volume of e.g. 0.75-1.3 litres. Within the console, and depending on the pressure range in the gas bottles, a pressure regulator can be mounted, to

which the gas bottles are connected. If a plurality of gas bottles are used these are optionally connected via the respective pressure regulator to a selector valve, whereby the respective gas bottle can be selected via the selector valve. The selector valve can be controlled mechanically or electrically by means of a rotary switch or a knob. In accordance with the invention, a so-called handheld device is connected to the outlet conduit of the console. The handheld device is thereby connected via a flexible connector hose or similar, e.g. a spiral hose, and allows a protective gas to be supplied to a food container without thereby manipulating or displacing the entire console including the storage container(s) (e.g. gas bottles, gas cylinders). The handheld device preferably comprises its own valve, which selectively releases or retains the protective gas. The actuation of the valve of the handheld device can thereby be effectedwith the aid of an actuator button or else due to attachment of the handheld device to an inlet valve of the food container, whereby an actuating member is displaced.

[0012] In order to preserve a foodstuff, the gas thus flows out of the gas bottle via the pressure regulator through the selector valve and the handheld device via the valve of the handheld device and a container valve into the food container or pouch. This can either only be gassed or additionally be flushed.

[0013] Because the inlet valve and the outlet valve are combined in a single valve unit the constructional complexity is minimized and the possibility is provided of activating and/or opening both valves simultaneously, for instance through attachment of the handheld device. Furthermore, the possibility is provided of reconditioning both valves at the same time, namely the inlet valve and the outlet valve, by disassembly and cleaning of the valve unit, which reduces the effort involved. Because attachment of the handheld device to the valve unit not only opens the inlet valve but also opens the outlet valve (for instance by mechanical actuation), the air contained within the food container can exit unhindered and be replaced by the protective gas flowing in through the inlet valve, thereby simplifying the flushing process. In such a configuration it is not necessary for the protective gas introduced via the inlet valve to create an initial overpressure in the container interior, whereby the outlet valve is opened, when, for example, it is configured as an overpressure valve, which would impede the gas exchange. In the configuration according to the invention it is on the contrary merely necessary

that turbulence is generated inside the food container due to the introduced protective gas and by a suitable arrangement of the inlet and outlet openings, the turbulence leading to displacement of the air present in the food container by the incoming protective gas and thereby ensuring that the introduced protective gas rapidly fills the entire volumeas a result of the advantageously created circular currents in the interior of the container, without losing an excessive amount of protective gas through leakage.

[0014] In a preferred manner the embodiment is hereby further configured such that the inlet valve is disposed radially within the outlet valve, whereby it is particularly preferred that the inlet and outlet valves each comprise a valve chamber and the valve chamber of the outlet valve is configured as an annular chamber surrounding the valve chamber of the inlet valve, viewed in the axial direction. In such a configuration the introduction of the protective gas occurs via the centrally disposed inlet valve, whereby the arrangement of the outlet openings radially exterior to and preferably distributed around the circumference of the valve unit favours the development of circular currents in the interior of the food container. In addition this is a particularly space saving configuration.

[0015] According to one preferred embodiment the valve unit comprises an axially displaceable stop face for an actuating member of the handheld device, so that the inlet and the outlet valve are opened during the axial insertion of the handheld device, optionally also by using the gas pressure. When the handheld device is attached to the valve unit an actuating member of the handheld device comes into effect, which, by exploiting the mechanical contact pressure, displaces the axially displaceable stop face of the valve unit, thereby effecting the opening of the inlet and the outlet valves. Opening of the inlet and/or the outlet valve optionally also occurs using the gas pressure of the inert gas that has been introduced, whereby in a preferred configuration the outflow of the gas out of the gas container is automatically initiated upon attaching or positioning of the handheld device on the valve unit, for which purpose the configuration is preferably effected in such a way that the handheld device comprises a valve and the actuating member of the handheld device is configured as a valve member displaceable against the force of a spring of the handheld device valve or interacts with the latter. The actuating member of the handheld device thus serves on the

one hand to open the valve of the handheld device and on the other hand, during attachment to the valve unit, to open the inlet valve and the outlet valve of the valve unit, so that upon attaching the handheld device to the valve unit all the valves are opened simultaneously.

[0016] According to a preferred embodiment the valve is actuated as a result of the valve unit comprising a valve piston that comprises both at least one gas passage opening of the inlet valve and at least one gas passage opening of the outlet valve. The inlet valve and the outlet valve thereby comprise a common valve piston. This allows combined actuation of the inlet and outlet valves, whereby the valve unit advantageously comprises a sealing element that is displaceable and/or deformable together with the valve piston, and as a function of the displacement position and/or deformation, opens or closes a connection between the valve chambers.

[0017] A particularly simple to construct embodiment results when it corresponds to a preferred configuration in which the valve piston or a piston rod immersing into the valve piston and movable together therewith, is provided with an axial gas passage bore, which is designed as a blind hole and communicates with at least one radial bore opening on one of the inner walls of a sealing element. In particular if the annular end face adjacent the at least one radial bore of the sealing element preferably interacts with a stop of the valve housing, a configuration results in which that the sealing element is deformed in such a way by actuating the inlet valve that a gap is created between the wall of the bore of the sealing element and the opening of the radial bore of the valve piston, so that the gas introduced via the central bore of the valve piston can escape via the radial bore and can enter the food container via corresponding valve openings.

[0018] With respect to the outlet valve, the axially displaceable valve piston functions as a valve memberwhich can be compressed against a corresponding valve in order to seal the outlet valve, for which purpose in a preferred configuration the valve seat of the outlet valve is formed by a sealing washer.

[0019] In an alternative embodiment of the valve unit the inlet valve and the outlet valve preferably comprise a common elastic sealing element, wherein the inlet valve is formed by a portion of the sealing element forming a valve spout and the outlet valve is formed by a portion of the sealing element forming a valve lip,

overlapping a valve plate having outlet openings. The valve unit can thereby be constructed in an extremely simple way, and in the simplest case be formed solely by the sealing element which is inserted into a wall of a food container or into the lid.

[0020] When preserving foods it can also be desirable to evacuate the food container. The foods to be preserved can either be stored in the evacuated container, or inert gas can be introduced into the container after its evacuation. In this connection the device according to the invention is preferably further configured such that a negative pressure source such as a vacuum pump is provided, which is connectable to the handheld device or disposed therein. Since the negative pressure source is connectable to or disposed within the handheld device, one and the same handheld device can optionally be used to create a vacuum in the food container, or perform a conventional inert gas flushing, or both. When evacuating the food container, the air contained within the food container is preferably aspirated via the outlet opening(s) of the outlet valve, and the device is preferably further configured in this context such that the handheld device is connectable to the valve unit so as to cover or encompass the outlet valve opening(s) of the outlet valve and comprises at least one suction duct which is connectable to the negative pressure source and opens into a space communicating with the outlet openings.

[0021] In an alternative embodiment it is possible for the outlet opening(s) of the outlet valve to be separately sealable, preferably with the aid of a disc optionally covering the outlet opening(s) by rotating, and the negative pressure source is connectable to the gas feed line of the handheld device.

[0022] Furthermore, a food container with an inlet valve for protective gas is described. In addition to the requirements such as good starting quality of product and raw materials, suitable temperature, good hygiene conditions and the use of agas mixture suitable for the product, the use of an airtight packaging that is designed for the product group is of highest importance. Precisely this point, the optimization of the packaging is a decisive factor for the efficiency of MAP. A distinction is made between food containers for "breathing" foods and food containers for "non-breathing" foods.

[0023] Containers for "non-breathing" foods are normally used for all forms of MAP-foods other than fruit and vegetables, and must have a sufficiently low permeability to oxygen/gas to have strong barrier qualities and be tightly sealed, since otherwise too much gas can escape. Generally, the residual oxygen content in such containers should be below 1 to 2%. At higher oxygen values MAP cannot be optimally used with respect to oxidation protection. Exceptions to this are special MAP-atmospheres, e.g. for fresh meat, which work with high oxygen concentrations. Carbon dioxide should be present in the protective atmosphere in a concentration of at least 20% in order to develop its bacteriostatic efficacy.

[0020] In the case of containers for breathing foods (vegetables and fruit), the permeability is important. Packaging material with the right permeability must be selected in order for MAP to be used successfully for fresh fruit and vegetables, since fruit and vegetables continue breathing naturally (respiring) even after harvesting. If the products are sealed in an insufficiently permeable film, undesired anaerobic conditions (< 1% O_2 and > 20% CO_2) develop whichlead to loss of quality. If fruit and vegetables are packaged in an excessively permeable film, on the other hand, only a little or none at all of the protective atmosphere will remain, and the loss of moisture leads in turn to an acceleration of the loss of quality. Examples of materials which can be used for MAP packaging of fresh products (fruit and vegetables) arefilms with micropores or LDPE films. If the packaging exhibits the correct permeability, the product can continue its normal breathing and stays fresh for longer without preservatives.

[0025] The permeable container can be formed to be resealable and/or reusable. The containers are preferably made available in different sizes and colours. The food container can be microwaveable, freezer proof and/or dishwasher-safe. The container can further be equipped with a date indicator. Furthermore, the containers made of glass should be ovenproof.

[0026] The container lids can be firmly attached to the container receptacle by means of the tabs principle or through a clip connection (interlocking of lid and receptacle) and prevent unwanted release of the container lid upon impact and a possible overpressure in the container.

[0027] The permeability of the reusable container can be achieved in diverse ways. At least a part of the container can be made of a gas-permeable material. The entire

container can be made of a permeable material or just parts of the container can be formed to be permeable. A part can be selected to be, for example, the whole lid or at least a part of the latter. The permeability can be achieved through the integration of permeable materials into the container. An example of suitable permeable material is film that is permeable and/or equipped with micropores. The film can e.g. be injected into or be welded onto a part of the container, e.g. the lid.

[0028] The permeable area can be located on the underside, in the middle or on top of the lid, can be welded to the lid, injected or the lid itself can be wholly or partly made of a thin, permeable material (e.g. Styrolux from BASF). Depending on the design, the container lid can have holes in it, which are covered only by the film and which ensure permeability. The lid can have, but depending on permeability requirements, etc., need not have openings. If the film or the thin part of the lid is sufficiently permeable for the corresponding application, and has sufficient mechanical properties to be dishwasher-proof or similar, the film can be attached in an "open" manner in the lid, i.e. spanning a large opening. The robust part with the openings around the film/thinner part should protect the film/thinner, permeable part from damage if the film is too fragile for the application. The combination of a robust lid and one or multiple permeable zones in the lid or the permeable lid itself can be made in combination with or without one or multiple valves, which permit gas intake into and/orgas outflowout of the container.

[0029] In the case of a food pouch the permeability can be achieved in such a way that the pouch has zones of a permeable film and zones of a non-permeable film. The permeability can e.g. result from the thickness of the film.

[0030] The invention is explainedin further detail below with reference to an exemplary embodiment schematically represented in the diagram. These show

Fig. 1 a first exemplary embodiment of a console containing a gas supply, with attached handheld device,

Fig. 2 a detailed view of the handheld device according to Fig.1,

Fig. 3 a second exemplary embodiment of the console,

Fig. 4 the console according to Fig. 3 with the housing open,

Fig. 5 a first configuration of the valve unit of the food container in longitudinal section in the non-actuated state,

Fig. 6 the valve unit according to Fig. 5 in the actuated state,

Fig. 7 the valve unit according to Fig. 6 with attached handheld device,

Fig. 8 a second configuration of the valve unit in longitudinal section in the non-actuated state,

Fig. 9 the valve unit according to Fig. 8 in the actuated state with attached household device,

Fig. 10 a third configuration of the valve unit in longitudinal section in the non-actuated state,

Fig. 11 the valve unit according to Fig. 10 in the actuated state,

Fig. 12 the valve unit according to Fig. 11 with attached handheld device,

Fig. 13 the valve unit according to Fig. 11 in perspective view,

Fig. 14 a fourth configuration of the valve unit in longitudinal section with attached handheld device,

Fig. 15 a valve unit according to Fig. 5 with attached handheld device with means of creating a vacuum,

Fig. 16 a fifth configuration of the valve unit in longitudinal section with attached handheld device for creating a vacuum,

Fig. 17 a plan view of the valve unit according to Fig. 16,

Fig. 18 a detailed view of the nozzle of the handheld device according to Fig. 16,

Fig. 19 a detailed view of the valve unit according to Fig. 16,

Fig. 20 a valve unit according to Fig. 14 with attached handheld device in a modified configuration,

Fig. 21 and

Fig. 22 food container configurations with an integrated valve unit,

Fig. 23 a permeable container lid in a first configuration,

Fig. 24 a permeable container lid in a modified configuration,

Fig. 25 a permeable container lid in a further modified configuration,

Fig. 26 a pouch clamp,

Fig. 27 the pouch clamp according to Fig. 26 in a sectional view,

Fig. 28 a bottle closure with valve,

Fig. 29 a bottle spout with valve,

Fig. 30 a detailed view of Fig. 29,

Fig. 31 a bottle spout with valve in a modified configuration,

Fig. 32 a detailed view of Fig. 31,

Fig. 33 a further modified configuration of a valve unit in the closed state,

Fig. 34 a plan view of the valve unit according to Fig. 33,

Fig. 35 the valve unit according to Fig. 33 in the open state and

Fig. 36 a plan view of the valve unit according to Fig. 35.

[0031] Fig. 1 and Fig. 2 show a first embodiment of the handheld device 1, which is attached to a pressure regulator 3 by means of a pressure hose 2, which in turn is attached to a bottle valve 4 of the pressure container 5 configured as a console. The pressure regulator 3 can optionally be omitted. The pressure regulator 3, the glass bottle 5, and various other components can be built into a housing. The pressure hose 2 and the handheld device 1 are permanently under pressure. The handheld device 1 is inserted and pressed down into the valve unit of the container or pouch for preservation of foods in the non-depicted container or pouch. Upon depressing the handheld device 1, the valve 6 of the handheld device opens, as do the inlet and outlet of the container or pouch valve. The protective gas flows from the gas bottle 5 through the pressure regulator 3, the pressure hose 2, the handheld device 1 and the inlet valve of the container into the latter. The container or the pouch is flushed by the gas, and the gas leaves it through the outlet valve. Upon removal of the handheld device 1 the valve unit of the container or pouch and the valve 6 of the handheld device seal by themselves. The container or the pouch is thus hermetically sealed and the foods in the container or pouch are now situated under a protective atmosphere.

[0032] As can be seen in Fig. 2, the pressure hose 2 is led into the handheld device 1 and is connected to the valve 6 of the handheld device with the aid of a screw fitting 7. The valve 6 of the handheld device consists of a piston 10 pressed against a seal 9 with the aid of a compression spring 8. The nozzle of the handheld device is marked 11.

[0033] A modified configuration of the console 12 is depicted in Fig. 3 and Fig. 4. The device housing is denoted 13 and comprises a handheld device 1 with a spiral hose. Two gas bottles 14, 15 are arranged with pressure regulator 16 and a

selector valve 17. The handheld device 1 is connected with the selector valve 17 via the spiral hose and comprises a gas outlet 18 for attaching to or holding on to a valve of a food container. Furthermore, a selector switch 19 for selecting one of the two gas bottles 14,15 is provided.

[0034] Fig. 5, 6 and 7 show a first configuration of the valve unit 21, whereby the valve unit 21 is depicted in the closed state in Fig. 5 and in the open state in Fig. 6. The valve unit serves to flush a container or pouch with a gaseous medium. It can be mounted in the lid or on the side of the container, or can be welded to a plastic pouch. The housing of the valve unit 21 consists of a lower part 22 of the housing and a lid 23 screwed into a thread of the lower part 22 of the housing. Using the handheld device 1, and in particular with the nozzle 11 and the piston 10 of the handheld device, the attachment of the same on the valve unit 21 causes displacement of the piston 24 of valve unit 21 (Fig. 6). As soon as the piston 24 and/or the piston rod 27 fixed within the piston is adjacent to a stop forming projection 25, the seal 26 is slightly stretched. If the handheld device 1 is further pressed (Fig. 6) the gaseous medium can escape through opening of the valve 6 in the handheld device 1. The gaseous medium flows through the central bore 28 of the piston rod 27 and escapes out the radial bore 29 which communicates with the central bore 28, which is designed as a blind hole, while the plastic seal 26 is further stretched.

[0035] Upon moving piston 24 from the displacement position of Fig. 5 to that of Fig. 6 the plastic seal 26 creates a seal on the stop surface 30 of the lower part 22 of the housing in such a way that the valve chamber 31 of the inlet valve and the valve chamber 32 of the outlet valve are separated from one another in the valve unit 21 and the gaseous medium can only escape through the inlet openings 33 out of the valve chamber 31 of the inlet valve and into the container or pouch. At the same time, the gaseous medium situated in the container or pouch can escape through the outlet openings 34 into the valve chamber 32 of the outlet valve, via the gas passage bores 35 in the piston 24 and the openings 36 in the lid 23. The openings 36 in the valve lid 23 and the gas passage bores 35 in the piston 24 are offset from each other to ensure an optimal sealing of the outlet valve. The piston 24 contacts an annular sealing washer 37 when in the sealed position. The handheld device 1 must be removed as soon as the venting is completed. The

valve 6 in the handheld device 1 is automatically closed due to the reset force of the compression spring 8. In the valve unit 21 there is also a compression spring 38, which presses the piston 24 against the sealing washer 37 when the valve is closing, and tightly seals the valve. The seal 26 is equipped with pull-handles to facilitate its removal for cleaning. After cleaning it is pushed back into the piston 24.

[0036] An alternative embodiment is featured in Fig. 8 and 9. The piston 24 of the valve unit 21 can be displaced using the handheld device 1. The piston 24 is pushed against the stop surface 30 of the lower part 22 of the housing by depressing the handheld device 1. If the handheld device is further pressed, the gaseous medium can escape by opening of the valve 6 in the handheld device 1. The gaseous medium flows through the central bore 28 and the radial bore 29 of the piston 24 and escapes out of the piston 24 while the plastic seal is stretched. When the piston 24 movesthe plastic seal 26 creates a seal on the stop surface 30 of the lower part 22 of the housing in such a way that the valve chambers 31 and 32 in the valve unit 21 are separated and the gaseous medium can escape only through the inlet openings 33 out of the valve chamber 31 of the outlet valve and into the container or pouch. At the same time, the gaseous medium present in the container or pouch can escape via the outlet openings 34 into the valve chamber 32 of the outlet valve and the gas passage bores 35 in the seal 26. The seal 26 is herewith equipped with slits. The downward pressure of the piston 24 causes the slits 39 in the seal 26 to stretch.

[0037] As soon as the evacuation is completed the handheld device 1 must be removed. The valve 6 in the handheld device 1 is automatically sealed. The valve unit seals by itself through the elasticity of seal 26 or with the aid of a return spring as shown in the embodiments of Fig. 5-7.

[0038] Fig. 10-13 show a further alternative embodiment of the valve unit 21. The embodiment essentially corresponds to the embodiment according to Fig. 5-7, whereby, however, no seal is directly mounted on the piston 24, but rather the piston 24 interacts with an annular seal 40 which is arranged on the base of the lower part of the housing, when the piston 24 is displaced to the lower position depicted in Fig. 11, in which the valve unit 21 is activated and/or opened.

Furthermore, a separate seal 51 is provided, which surrounds the piston in the region of the radial bores 29.

[0039] Another alternative embodiment of a valve unit 41 is shown in Fig. 14, in which the inlet and outlet valve comprise a common elastic sealing element 42, wherein the inlet valve is formed by a portion of the sealing element 42 forming a valve spout 43 and the outlet valve is formed by a portion of the sealing element 42 forming a valve lip 44 overlapping a valve plate having outlet openings 34. The nozzle 11 on the handheld device is attached to the valve unit 41 and is thus sealed at the same time. The handheld device 1 is actuated and thereby opens the valve 6 in the handheld device 1. The gas flows through the nozzle 11, opens the valve spout 43 by force of pressure and flows into the container or pouch and builds up a certain overpressure in the latter. If the overpressure in the container or pouch is sufficiently large the lip seal 44 of the valve unit 41 opens and the gas flows through the outlet openings 34 on the valve plate, which can be a part of the container or an additional component, out of the container or pouch, wherebyit is flushed.Upon removing the handheld device 1 the valve unit 41, formed as a duckbill-umbrella valve, seals through the slightly dominant overpressure in the container or pouch, whereby the valve spout 43 is compressed. At the same time the dominating preload in the valve spout 43 serves to create an optimal sealing of the valve unit.

[0040] A further alternative embodiment is shown in Fig. 15, with which a vacuum can be created in the food container and with which the possibility exists of flushing the container with inert gas when using the same valve unit.

[0041] The valve unit corresponds to the valve unit 21 shown in the Fig. 5-7. The piston 24 of the valve unit 21 can be displaced by using the handheld device 1. As soon as the piston 24 interacts with the stop surface 30 the seal 26 is slightly stretched. By actuating a switch valve (not shown) on the handheld device 1, which allows switching between the vacuum creation mode and flushing, the vacuum pump is activated and creates a pre-setunderpressure.

[0042] The air in the food container is aspirated via the outlet openings 34 in the lower part 22 of the housing, the gas passage bores 35 in the piston 24, the openings 36 in the lid 23 and finally through the bores 45 in the handheld device 1. The seal adapter head 46 impedes aspiration of air from the surrounding atmosphere. This

seal adapter head 46 can be permanently or removably attached to the handheld device 1.

[0043] After the pre-set underpressure has been reached, the vacuum pump switches itself off automatically. If the vacuum pump is switched off, switching of the switch valve (not shown) in the handheld device 1 will open the gas flow and the gaseous medium will flow through the valve 6 in the handheld device 1. Subsequent functioning is as described for Fig 5-7.

[0044] It is, of course, possible just to create a vacuum or just to flush the container or pouch using this valve unit 21 and the handheld device 1. This occurs by bringing the switch valve (not shown) in the handheld device 1 into the corresponding position and thereby activating the corresponding mode (vacuum or flushing).

[0045] An alternative embodiment of the valve unit 21 is shown in Fig. 16-19, with which, together with the handheld device 1, a vacuum can be created in the food container, and with which, by using the same valve unit, it is also possible to flush the container with inert gas.

[0046] The embodiment corresponds essentially to the embodiment according to Fig. 5-7, although in order to create a vacuum the openings 36 in the valve lid 5 can be sealed by rotating the sealingwasher 47. This prevents aspiration of air from the surrounding atmosphere. Thus the valve unit 21 functions only in one direction.

[0047] The handheld device 1 is inserted into the valve unit 21 in such a way that the groove 48 on the nozzle 11 of the handheld device, as well as the groove 49 in the valve unit 21 are displaced towards each other. This has the effect that the flow channels are free and the air in the container or pouch can be aspirated out of the valve unit after depressing the handheld device 1 and thereby the piston 24. As soon as the piston 24 is in the end position the seal 26 is slightly stretched. By actuating the switch valve (not shown) on the handheld device 1, which allows switching between the vacuum creating and flushing modes, the vacuum pump is activated and creates a pre-set underpressure. The air in the food container is aspirated via the outlet openings 34 in the lower part 22 of the housing, the gas passage bores 35 in the piston 24, the openings 36 in the valve lid 23 and finally through the nozzle 11 of the handheld device. After reaching the pre-set underpressure the vacuum pump switches off automatically.

[0048] If the valve unit 21 is used for flushing the container or pouch the sealing washer 47 is rotated in such a way that the openings 36 in the lid 23 and in the sealing washer 47 align with each other, whereby the ventilation channels are free. The handheld device 1 is inserted into the valve unit in such a way that the groove 48 on the nozzle 11 of the handheld device and the groove 49 in the valve unit 21 interlock. This has the effect that the flow channels between the nozzle 11 of the handheld device and the valve chamber 32 of the outlet valve are closed and the gaseous medium has to flow through the piston rod 27. Flushing of the food container can proceed as explained in the description of Fig. 5-7.

[0049] The same principle of the rotatable sealing washer for creation of a vacuum or for carrying out a flushing operation kann also be achieved using the valve unit according to Fig. 8 and 9, or by using the valve unit according to Fig. 10 to 13.

[0050] A further alternative embodiment of the invention is illustrated in Fig. 20, with which a vacuum is created in the food container and a flushing operation can be carried out. The valve unit 41 essentially corresponds to the valve unit according to Fig. 14. The nozzle 11 on the handheld device is attached to the valve unit 41, and at the same time seals and penetrates the valve spout 43. The switch valve in the handheld device 1, which allows switching between the flushing and vacuum modes (not shown) is actuated (vacuum activation). The air in the container or pouch is aspirated via the nozzle 11 of the handheld device. Before flushing, a vacuum in created, through which the seal lip 44 is pressed against the valve plate.

[0051] After creating a vacuum the valve on the handheld device 1 is switched over and the flushing mode is activated and a flushing operation results as explained in the description of Fig. 14.

[0050] Figs. 21a, 21b, 22a, and 22b show food containers 50 which are equipped with the valve unit 21. The valve unit 21 is arranged in the lid of the container in each case, so that each container can be used with the appropriate lid size and no special adaptations of the container itself are necessary.

[0053] The inlet openings 33, through which the protective gas flows into the container 50, are orientated relative to the container geometry in such a way that circular and/or vortical currents result, which ensure an optimal flushing of the container.

Depending on the container geometry, the valve unit21 is thus attached at a different positionor has a different nozzle orientation.

[0054] The protective gas enters the container 50 via the inlet openings 33, creates circular and/or vortical currents within the container, flows according to this rotational movement via the outlet openings 34 into the valve unit 21 and leaves the latter via the openings 36.

[0055] In order to protect the container from a possible overpressure, a separate overpressure valve can be provided in the container. Protection from overpressure can, however, also be carried out at the level of the device.

[0056] A lid 37 for a food container for "non-breathing" foods is shown in Fig. 23. A permeable film 38 is arranged as an intermediate layer in the lid 37. The lid 37 comprises a plurality of perforations 39, through which gas can escape though the film 38.

[0057] As shown in Fig. 24, the lid 37 can comprise one single open area 40spanning the permeable film 38 instead of the plurality of perforations 39. The film 38 can be welded into the container lid 37 or can be injection moulded withit.

[0058] Fig. 25 shows an embodiment in which the lid 37 comprises an insert, whereby the insert 41 comprises the film 38. In this configuration, with a lid 37 with a permeable insert 41, the permeable insert 41 is situated between the lid 37 and the container receptacle 42. The insert 41 can be removed in whole or in part from the receptacle 42 and/or the lid 37. It comprises a scaffold (robust part) on which the film 38 is welded, injected or similar. This can be located underneath, in the middle or on top of the insert 41, can be welded to the insert 41,injected, or the insert 41 itself can be composed entirely or partially of a thin, permeable material (e.g. Styrolux from BASF). The insert 41 between the container receptacle 42 and container lid 37 ensures the permeability of the container and thus has a certain gas permeability. The container lid 37 is removable from the container receptacle 42 or is attached via hinges or similar, and comprises certain openings for breathing, is itself sufficiently permeable or can be gas-tight when a sufficiently large head volume is present.

[0059] The permeable insert 41 functions exactly as described above for the lid. The scaffold may therefore include multiple openings in order to protect the film 38, or not. The insert 41 is pressed via the lid 37 onto the receptacle 42, or is clamped

or clipped or similar in the receptacle and thereby separates the container into two or more volumes. The insert may have, but need not have, a sealing material at the contact points with the receptacle 42 and/or the container. Furthermore, the scaffold itself can also be sealing. The lid 37 can have one or several openings, which connect the upper volume with the atmosphere and thereby ensure exchange of the gases.

[0060] In another embodiment the entire container or the container receptacle is party or entirely manufactured from a permeable material. The film can be welded to the container receptacle, injected, or the container receptacle itself can be wholly or partially composed of a thin, permeable material (e.g. Styrolux from BASF). Depending on its configuration, the container receptacle comprises holes, which are covered only by the film and through which permeability can be ensured (protection of the film, thinly-layered part of the container, from mechanical influences). However, if the film is sufficiently thick these can be omitted and the film (thin-walled part) alone can constitute a part of the container lid surface or the entire receptacle.

[0061] The valve, independently of how it is designed, can advantageously be integrated into a pouch clamp 43 for sealing a food pouch (see Fig. 26 and 27). The pouch clamp 43 serves to seal a pouch and for subsequent gassing of the food in the pouch. The pouch is clamped between the two brackets 44 and 45, which are U-shaped, trianguiar, or have other shapes. The gas pipe or the gas hose 46 thus extends into the interior of the pouch. The two bracket halves 44 and 45 of the clamp rotate about the rotation line or rotation lines, which can be along the clamp 43 or at one of the two ends. The valve 47 is integrated into one of the clamp halves 44 or 45, or into the middle of the clamp 43.

[0062] The valve can also be integrated into a bottle closure 48 (see Fig. 28). The different valve configurations can be, as with the pouch seal, combined with or without a gas pipe, which extends into a bottle or general container. The closure 48 is formed as a normal cork, which is fitted onto or into the bottle and is provided with one of the already mentioned valves or similar. The bottle or container can thus be gassed or flushed via the valve 49. The outer casing of the plug 48 or the plug 48 itself can partially or wholly be made of an elastomer and thus the plug and the valve 49 can be formed in one piece. For gassing, the valve

49 is, depending on its construction, either opened by gas pressure, or the valve 49 is penetrated by a gas nozzle, or the valve 49 is opened by means of a depressing or rotating mechanism.

[0063] Furthermore, a combined pouring spout, filter, plug, drip-stop,and oxidation protection can be provided in the case of wine, oil and the like. The pouring spout should prevent the bubbling out of CO_2 in the case of sparkling wine or the like.

[0064] Fig. 29 and 30 show in this connection a sealing system with pouring spout 50, filter 51, plug, drip-stop 52 and MAP-protective system, which can be used for all sorts of fluids, such as wine, sparkling wine, oil, vinegar etc. The pouring spout 50 is placed on a bottle and is tightly connected with the same via seal 54. The sealing system with valve 53 with or without gas pipe 55 is then inserted into it. By actuating the valve 53 the gas flows via the inlet 57, past the seal 58, via the plug into the bottle, and flushes the latter. If there is no ventilation 56 in the valve 53 the content is only gassed. If there is ventilation, then flushing occurs. The returning gas flows then via filter 51, opening 56 in the sealing system and finally via valve 53 into the atmosphere. The seal 59 seals the opening of the gas pipe when the pouring spout is used. Thus the fluid flows through the filter, which can be mounted cylindrically or radially in the pouring spout. If it is radially arranged, i.e. axially with the gas pipe, the gas pipe penetrates the filter (not shown). According to application this sealing system can incorporate all functional components or just parts thereof.

[0065] Various types of valves can be used. In the case of an integrated valve with eccentric inlet channels the valve 53 is actuated by depressing it, the spring 60 is compressed, and thereby the inlet and outlet, to the extent that they are present, are opened. The gas flows via the inlet openings 57, via inlet sealing point 61 into the bottle, container, pouch etc. If the valve is formed as a 2-way valve the gas flows via outlet openings 56 into the atmosphere. If the valve is no longer actuated the inlet and outlet are sealed. The valve can itself be integrated in a pouch, bottle plug, container etc.

[0066] In the case of an integrated valve with centric inlet channels the valve is actuated by depressing it, the spring is compressed, the piston moves downwards and thereby the inlet and outlet, to the extent that they are present, are opened. The piston is displaced and thus the inlet openings in it end up in operative

connection via the indentation in the inlet port. The seal can be mounted on the piston or also on the inlet port. The gas thus flows via the central inlet opening, via the indentation in the inlet port, into the bottle, container, pouch etc. If the valve is formed as a 2-way valve the gas flows via the outlet openings into the atmosphere. If the valve is no longer actuated the inlet and outlet are sealed. The valve can be integrated in a pouch, bottle plug, container etc.

[0067] In the case of a valve with a central inlet canal and a mechanism for sealing the outlet openings (Fig. 31 and 32), upon depressing the gas flows via the central opening 62 via a seal 63 into the container or pouch. Upon depressing, the plunger 64 separates the inlet and outlet volumes. The plunger presses on gas pipe 69. The gas flows via the outlet volume and its seal 65, via the outlet channels 66, via the rotating wheel 67 to seal the outlet openings to the atmosphere, if the openings 68 in the rotating wheel coincide with the outlet channels 66. If the outlet channels 66 are sealed by rotating wheel 67 an overpressure can thereby be created in the container, bottle.

[0068] A further, modified embodiment of a valve unit is shown in Fig. 33, 34, 35 and 36, as it can be integrated in a food container. The valve unit is configured as a rotatable container valve. The basis of this container valve is that the opening and closing of the valve results from a rotational movement of the rotation plate 70. The rotatable container valve is composed of a rotation plate 70, an upper part 71, which is welded to the container lid or receptacle or is directly integrated in the container lid or in the container receptacle, and a lower part 72. The container valve is opened through a rotational movement of the rotation plate 70 in order to introduce gas. The gas can thereby flow into the intermediate chamber 73, when the valve is open then into chamber 74, and thereafter via opening 75 into the container. In this position the gas exit opening 76 in the container valve is open and the gas can escape via the valve out of the container. After introducing the gas into the container the valve is closed again by another rotational movement. The valve can be actuated using the handheld device, by the main device itself (depending on the device configuration), or by hand. A groove 77 is provided for actuation, i.e. for turning the rotation plate 70.

[0069] If only one inlet valve is required the valve does not have a gas outlet opening 76. The valve can moreover also be integrated in a pouch or the like.

[0070] Fig. 33 and 34 show the valve in the closed state. Fig. 35 and 36 show the valve in the open state.

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716290/DO

ÉLELMISZER TARTÓSÍTÁSÁRA SZOLGÁLÓ ESZKÖZ

SZABADALMI IGÉNYPONTOK

1. Eszköz élelmiszerek otthoni tartósítására védőgáz segítségével, amely eszköz magában foglal legalább egy szabadonálló készüléket (12) gáztartállyal (14, 15), egy, a szabadonálló készülékkel (12) legalább egy hajlékony vezetéken, különösen nyomótömlőn keresztül összekötött kézi készüléket (1), amelynek van egy saját, a védőgázt tetszés szerint kiengedő vagy visszatartó szelepe, és egy gázzáróan lezárható élelmiszertartó edényt, amely kézi készülék (1) a gáztartálynak (14, 15) az élelmiszertartó edény szelepegységéhez való csatlakoztatására szolgál, továbbá a szelepegységnek van egy beeresztő szelepe és egy kieresztő szelepe, amelyek egyidejűleg működtethetők.

2. Az 1. igénypont szerinti eszköz azzal jellemezve, hogy a szabadonálló készülékben legalább két gáztartály (14, 15), különösen gázpalack van elhelyezve, amelyek előnyös módon egymástól különböző gázkeveréket tartalmaznak, és egy váltószelepen (17) keresztül vannak a kézi készülékhez (1) csatlakoztatva.

3. Az 1. vagy a 2. igénypont szerinti eszköz, azzal jellemezve, hogy a beeresztő szelep sugárirányban a kieresztő szelepen belül van elhelyezve.

4. Az 1., a 2. vagy a 3. igénypont szerinti eszköz, azzal jellemezve, hogy a beeresztő és a kieresztő szelepnek van egy-egy szelepkamrája (31, 32), továbbá a kieresztő szelep szelepkamrája (32) gyűrűs kamraként van kialakítva, amely tengelyirányban körülveszi a beeresztő szelep szelepkamráját (31).

5. Az 1-4. igénypontok egyike szerinti eszköz, azzal jellemezve, hogy a szelepegységnek (21) van egy tengelyirányban eltolható ütközőfelülete a kézi készülék (1) működtető tagja (10) számára, úgyhogy a beeresztő és a kieresztő szelep a kézi készülék (1) – adott esetben gáznyomás alkalmazása közben történő – tengelyirányú bevezetésekor nyitva van.

6. Az 1-5. igénypontok egyike szerinti eszköz, azzal jellemezve, hogy a kézi készüléknek (1) van egy szelepe (6), és a kézi készülék (1) működtető tagja a kézi készülékhez tartozó szelepnek (6) egy rugó (8) ereje ellenében eltolható szeleptagjaként (10) van kialakítva, vagy ezzel együttműködik.

7. Az 1-6. igénypontok egyike szerinti eszköz, azzal jellemezve, hogy a szelepegységnek (21) van egy szelepdugattyúja (24), amelynek van legalább egy, a beeresztő szelephez tartozó gázáthaladási nyílása (28) is és legalább egy, a kieresztő szelephez tartozó gázáthaladási nyílása (35) is.

8. Az 1-7. igénypontok egyike szerinti eszköz, azzal jellemezve, hogy a szelepegységnek (21) van egy, a szelepdugattyúval (24) együtt eltolható és/vagy alakítható tömítőeleme (26), amely az eltolási helyzettől, illetve az alakváltozástól függően nyitja vagy lezárja a szelepkamrák (31, 32) közötti összeköttetést.

9. Az 1-8. igénypontok egyike szerinti eszköz, azzal jellemezve, hogy a szelepdugattyú (10) vagy egy, a szelepdugattyúba (10) süllyesztett, vele mozgatható dugattyúrúd (27) el van látva egy tengelyirányú gázáthaladási furattal (28), amely vakfuratként van kialakítva, és összeköttetésben van legalább egy sugárirányú furattal (29), amely egy tömítőelem (26, 51) egyik belső falába torkollik.

10. Az 1-9. igénypontok egyike szerinti eszköz, azzal jellemezve, hogy a tömítőelemnek (26) a legalább egy sugárirányú furattal (29) szomszédos, gyűrű alakú homlokfelülete együttműködik a szelepház (22) egy ütközőjével (30).

11. Az 1-10. igénypontok egyike szerinti eszköz, azzal jellemezve, hogy a kieresztő szelep szelepülését tömítőgyűrű (37) képezi.

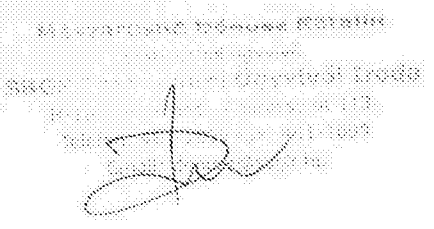
12. Az 1. vagy a 2. igénypont szerinti eszköz, azzal jellemezve, hogy a beeresztő és a kieresztő szelepnek van egy közös, rugalmas tömítőeleme (42), és a beeresztő szelepet a tömítőelemnek (42) egy szelepcsőrt (43) kialakító része, a kieresztő szelepet pedig a tömítőelemnek (42) egy szelepszájat (44) kialakító része képezi, amely szelepszáj túlnyúlik egy kieresztő nyílásokkal (36) ellátott szeleptányéron.

13. Az 1-12. igénypontok egyike szerinti eszköz, azzal jellemezve, hogy rendelkezésre áll egy vákuumforrás, például vákuumszivattyú, amely a kézi készülékhez (1) csatlakoztatható vagy benne van elhelyezve.

14. A 13. igénypont szerinti eszköz, azzal jellemezve, hogy a kézi készülék (1) úgy csatlakoztatható a szelepegységhez (21), hogy lefedi, illetve magába foglalja a kieresztő szelep kieresztő nyílását (nyílásait) (36), és van legalább egy, a vákuumforrással összeköthető, egy, a kieresztő nyílásokkal (36) összeköttetésben álló térbe torkolló, elszívó vezetéke (45).

15. Az 1-14. igénypontok egyike szerinti eszköz, azzal jellemezve, hogy a kézi készülék (1) úgy van kialakítva, hogy a gáztartály töltéséhez csatlakoztatni lehessen egy gázforráshoz.

(A meghatalmazott)



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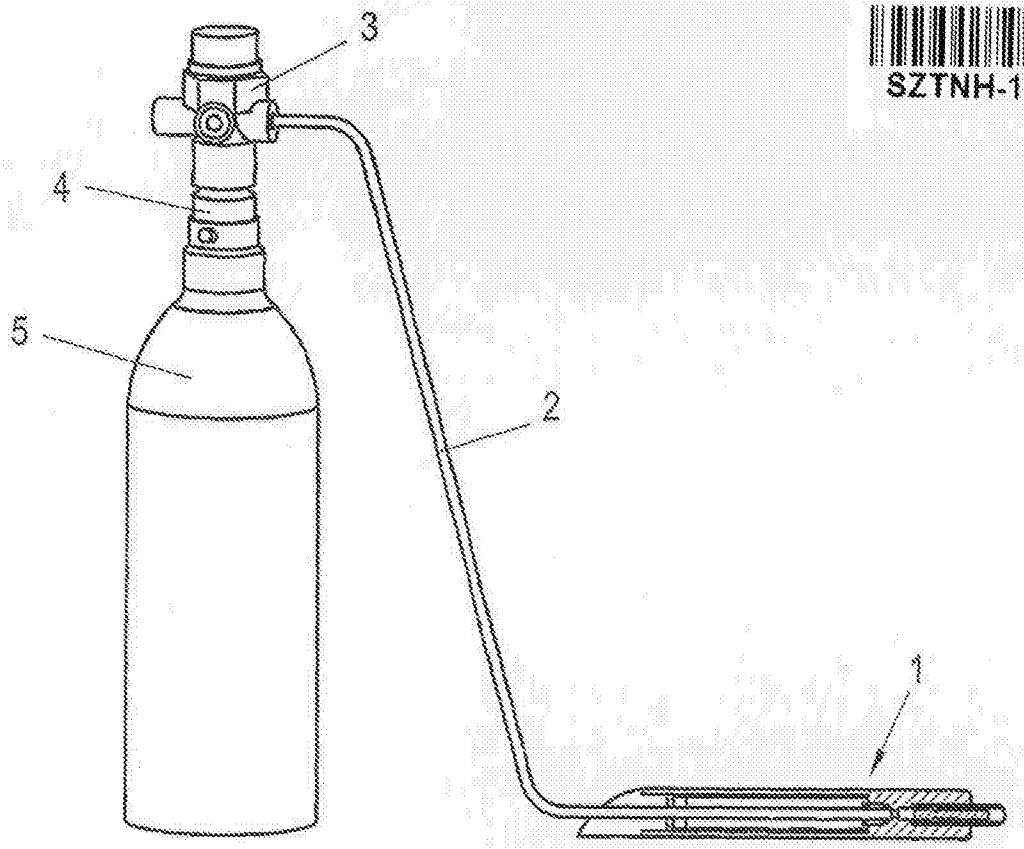

Fig. 1

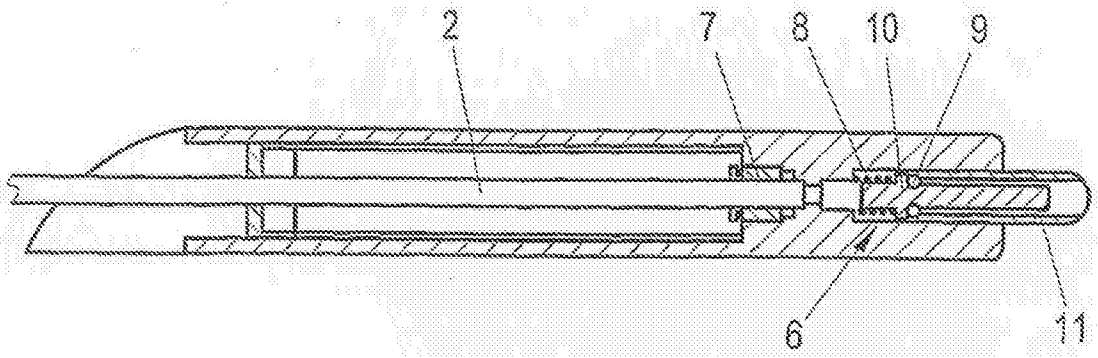

Fig. 2

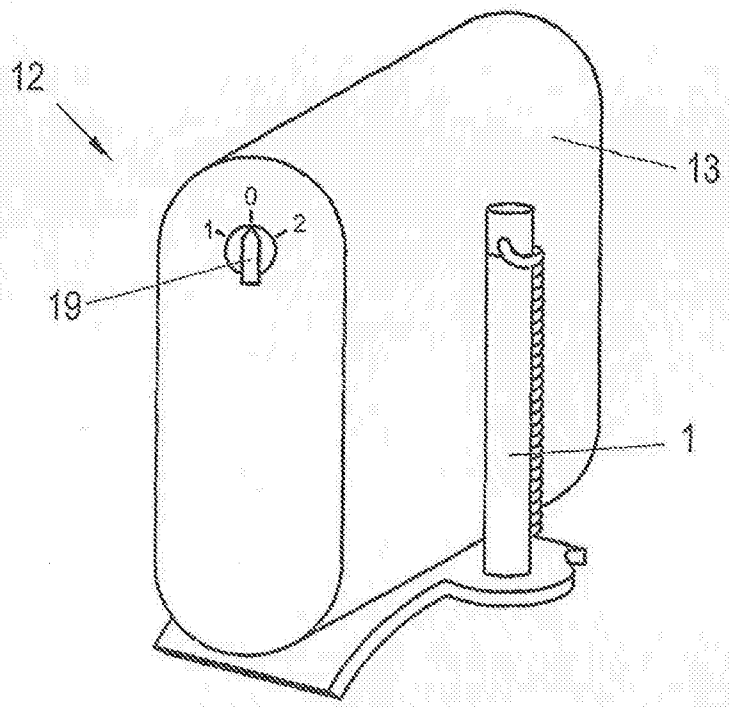

Fig. 3

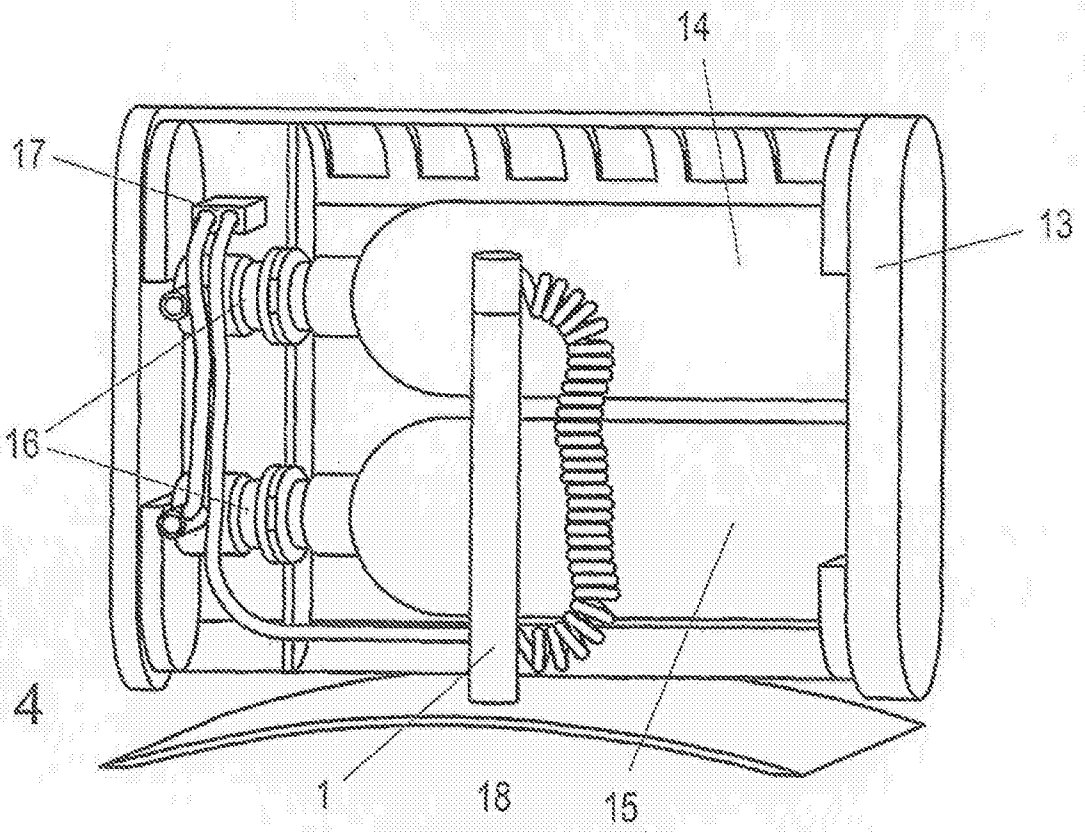

Fig. 4

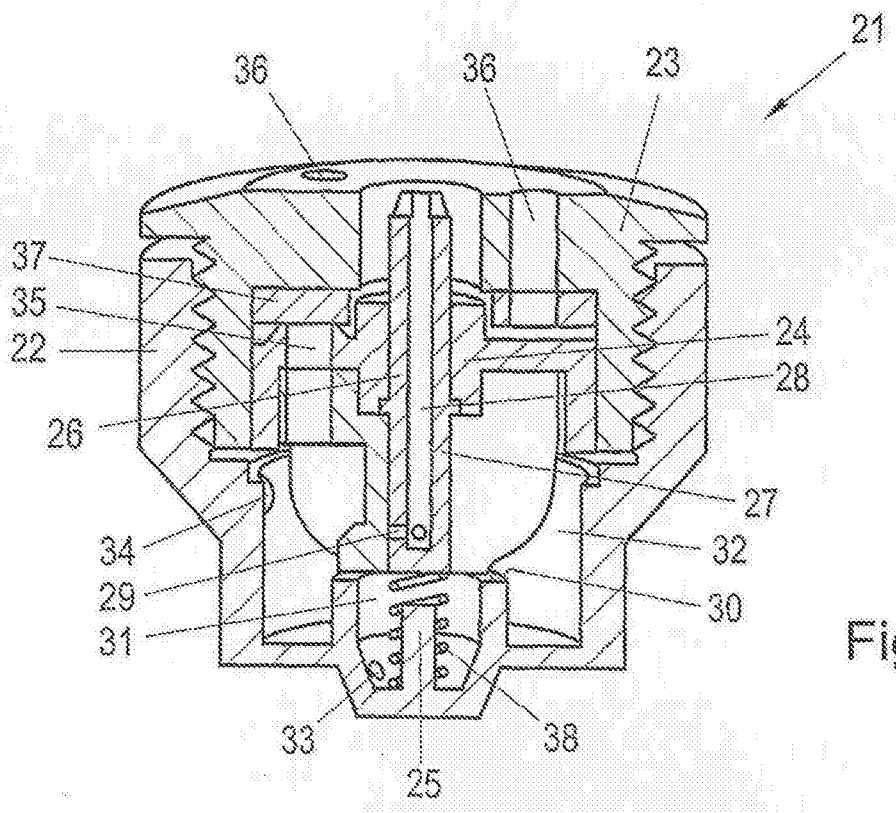
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Fig. 5

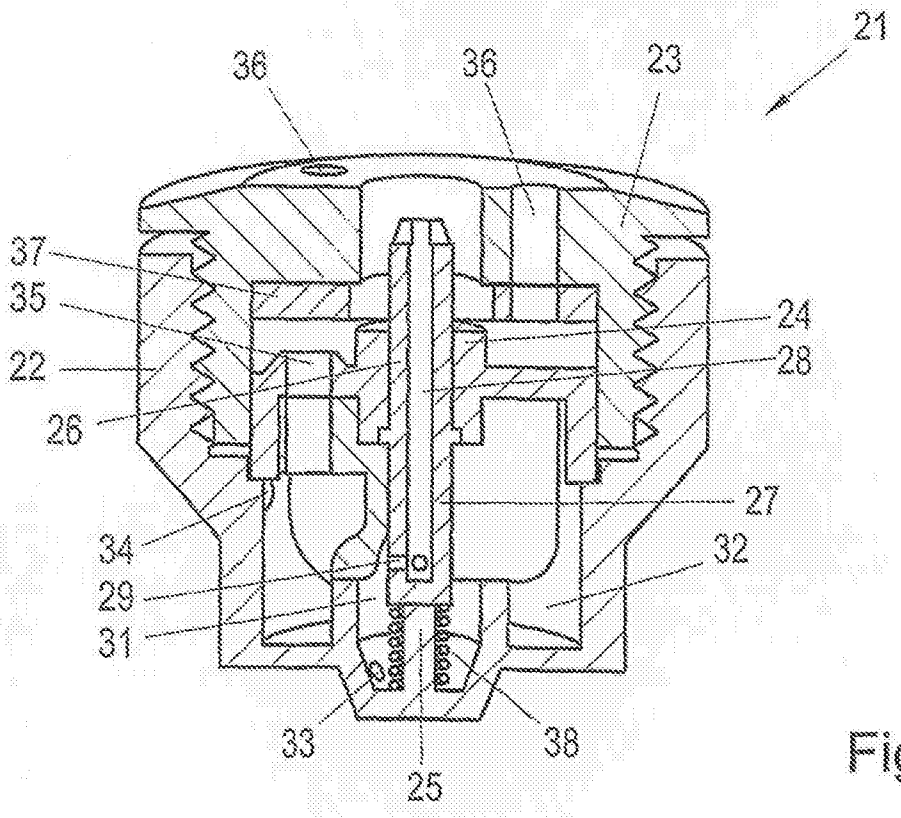
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Fig. 6

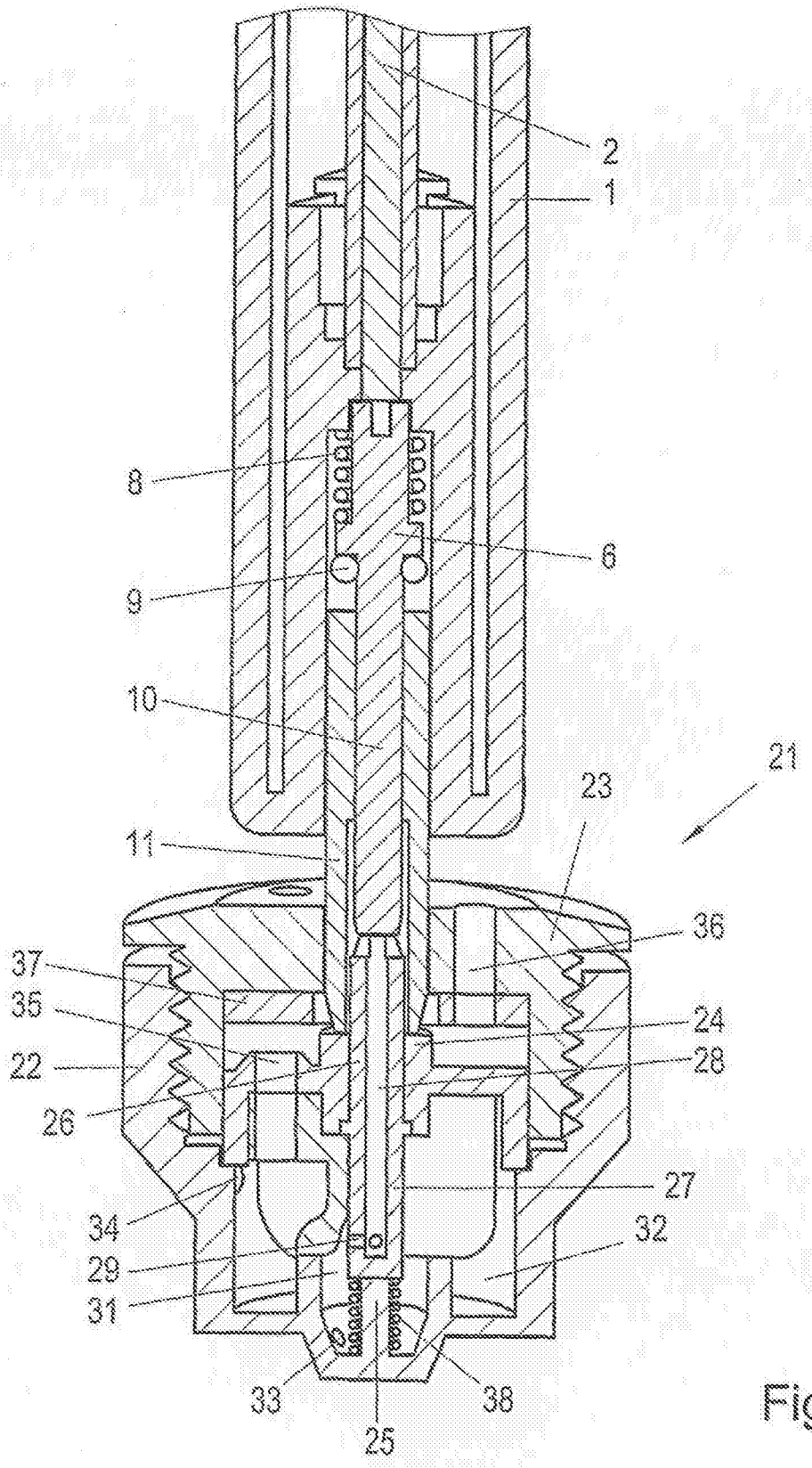


Fig. 7

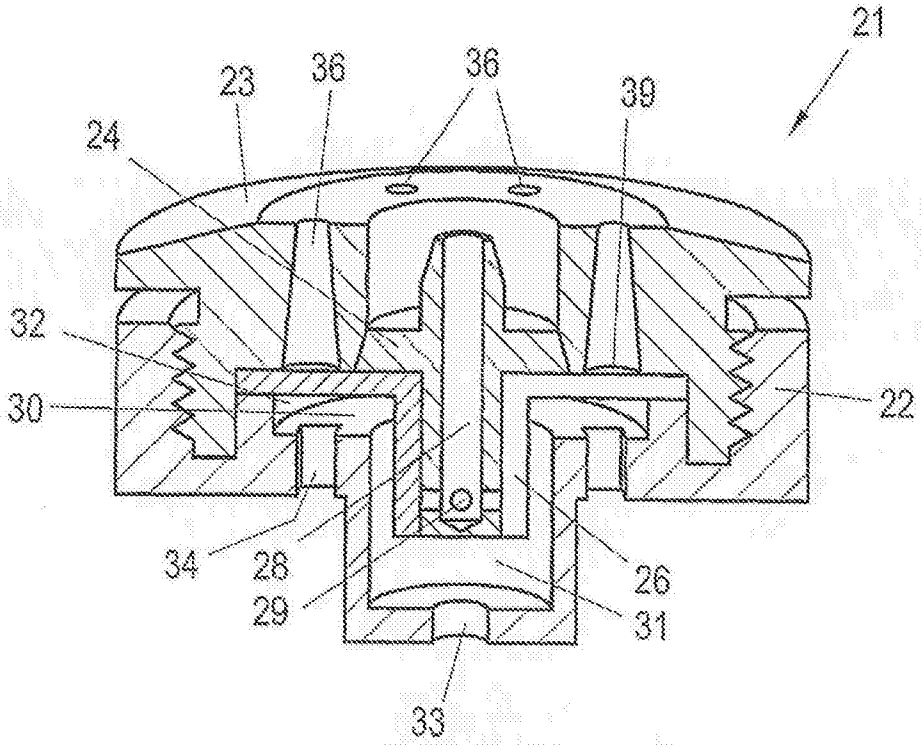


Fig. 8

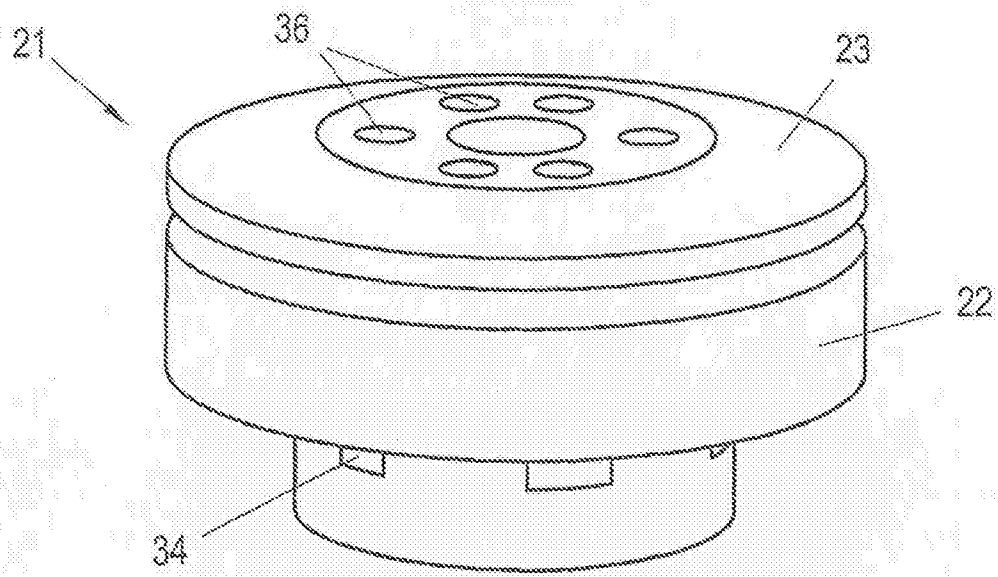


Fig. 13

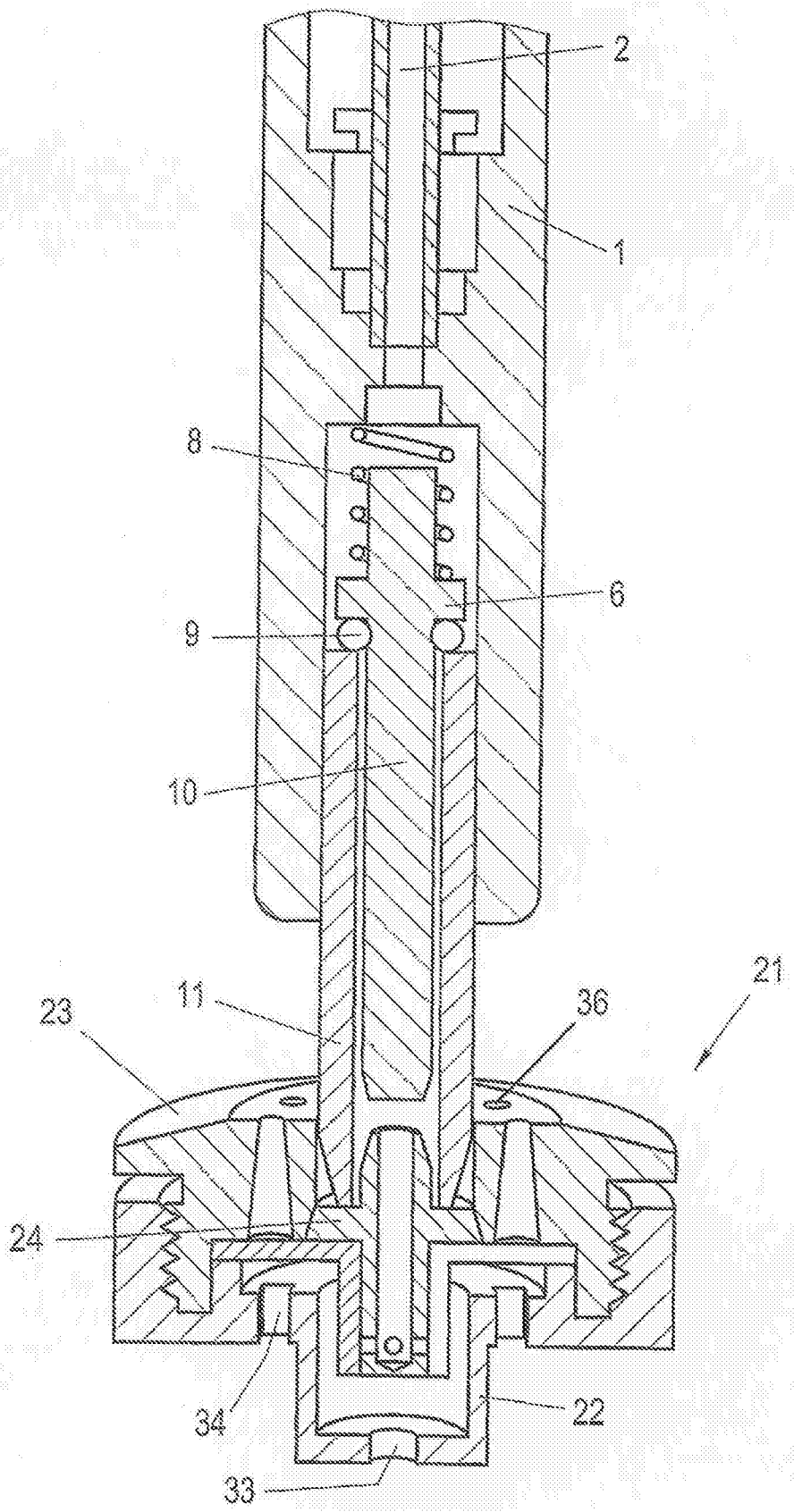


Fig. 9

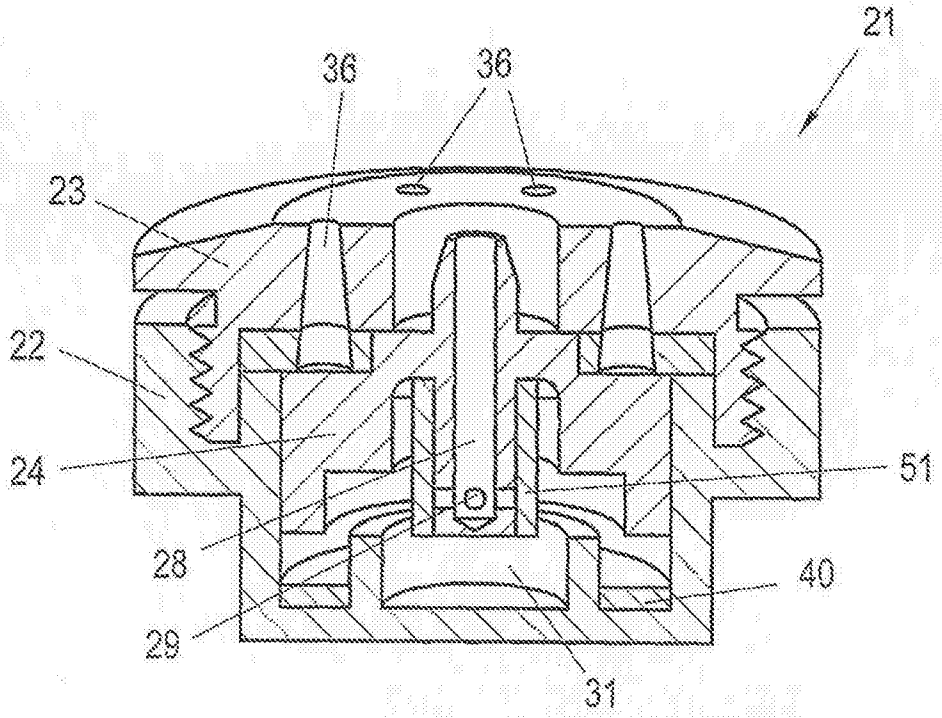


Fig. 10

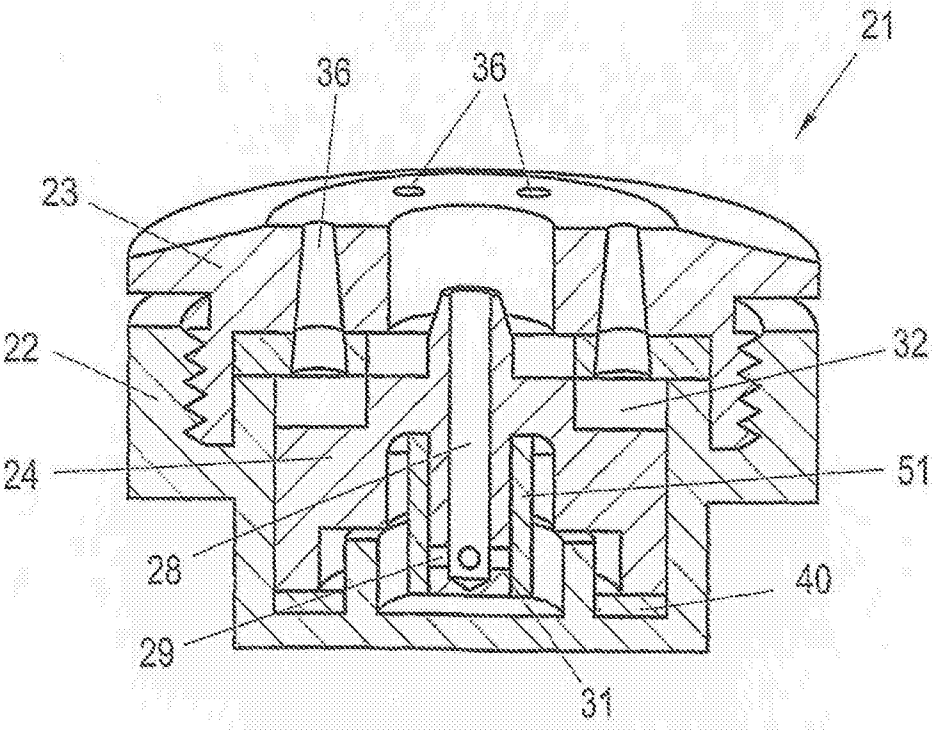


Fig. 11

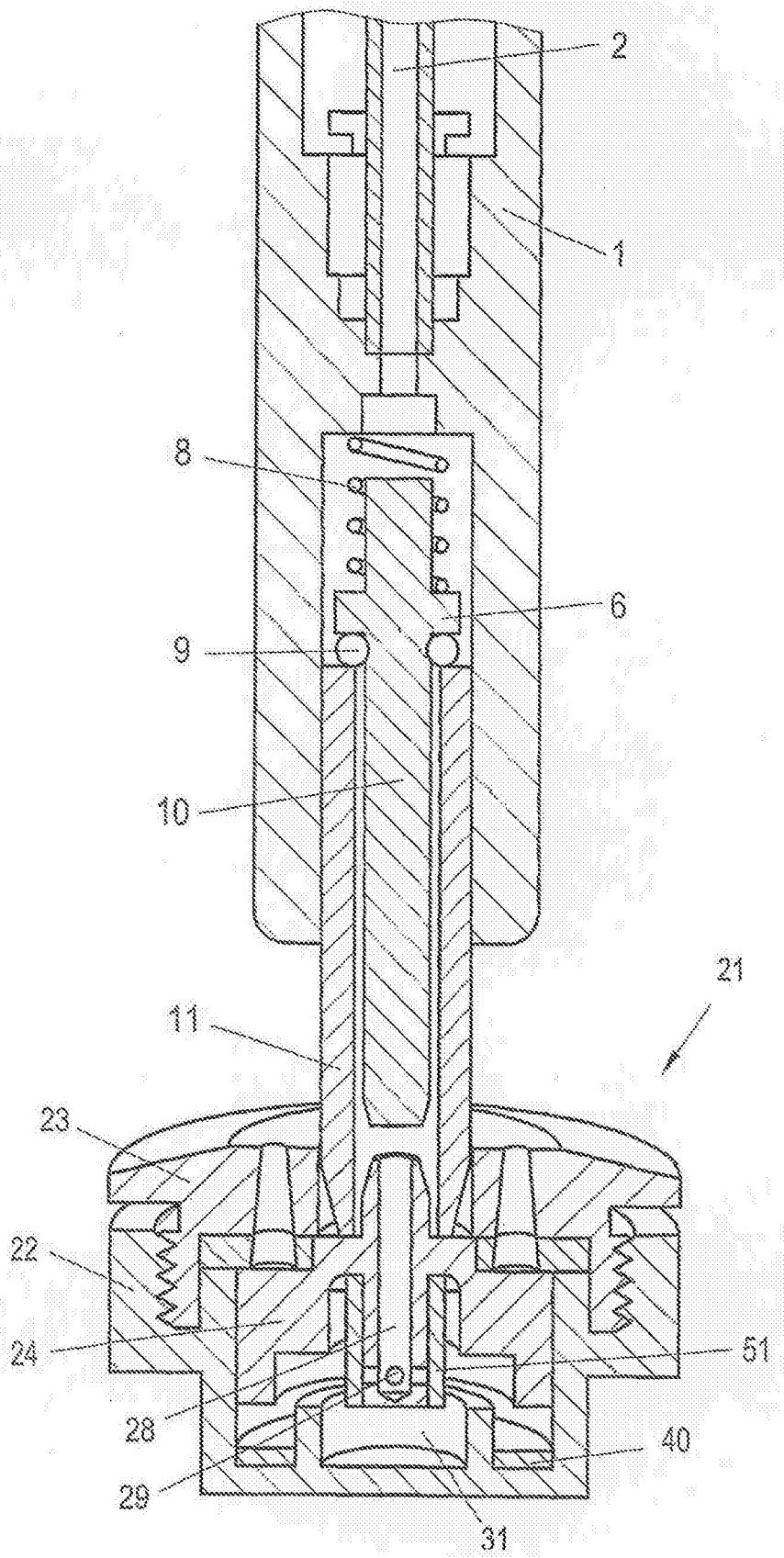


Fig. 12

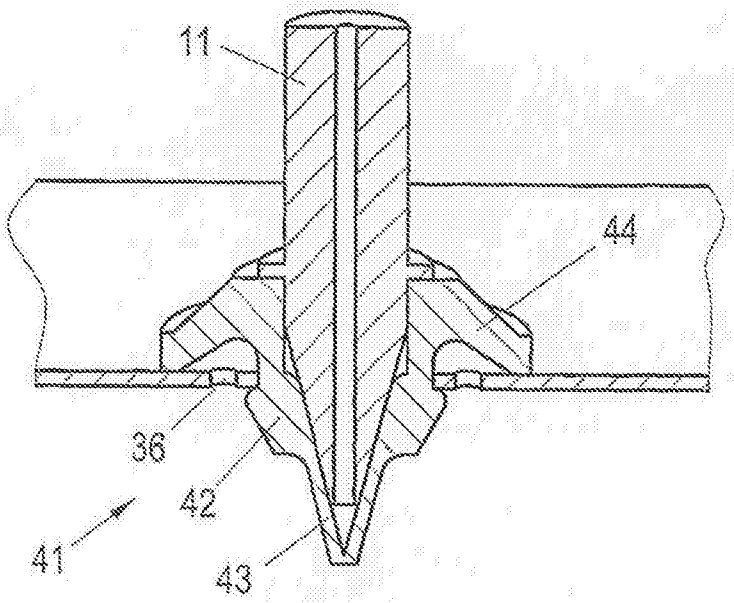


Fig. 14

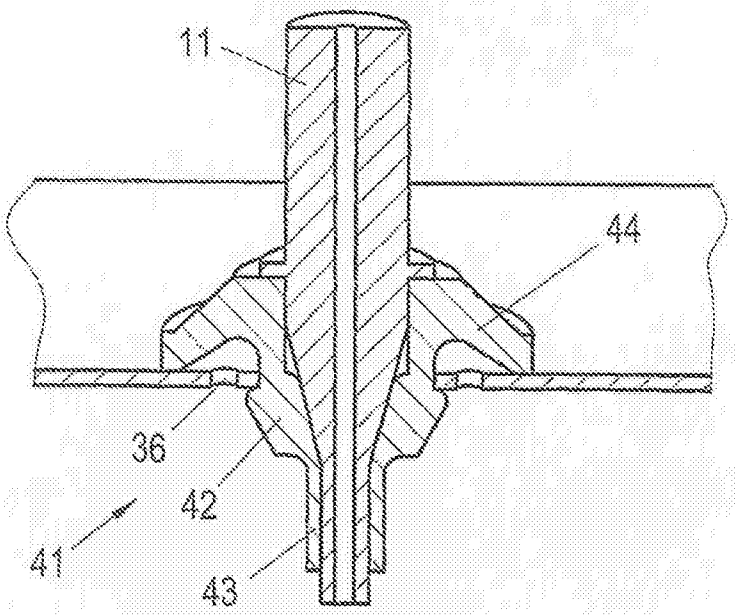


Fig. 20

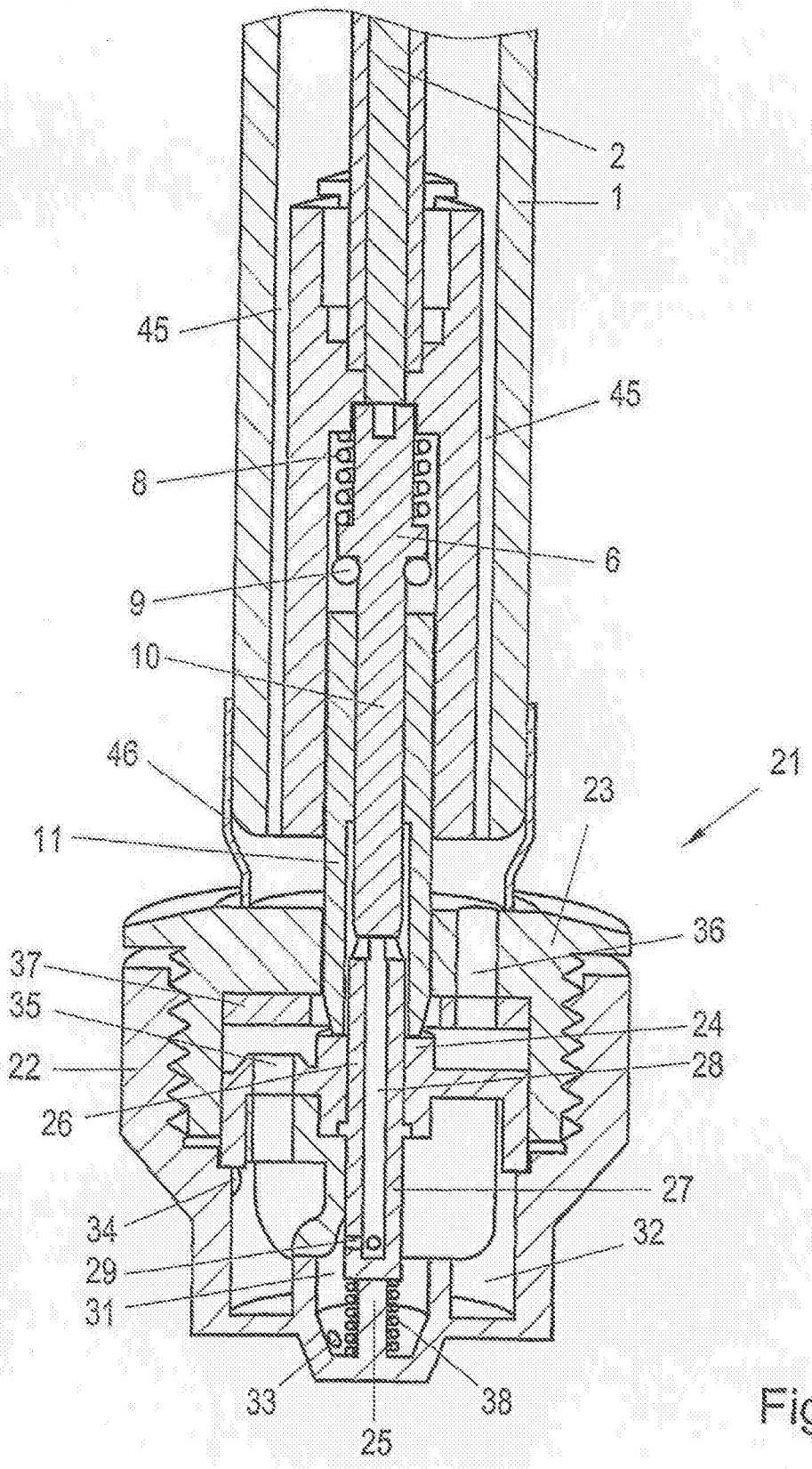


Fig. 15

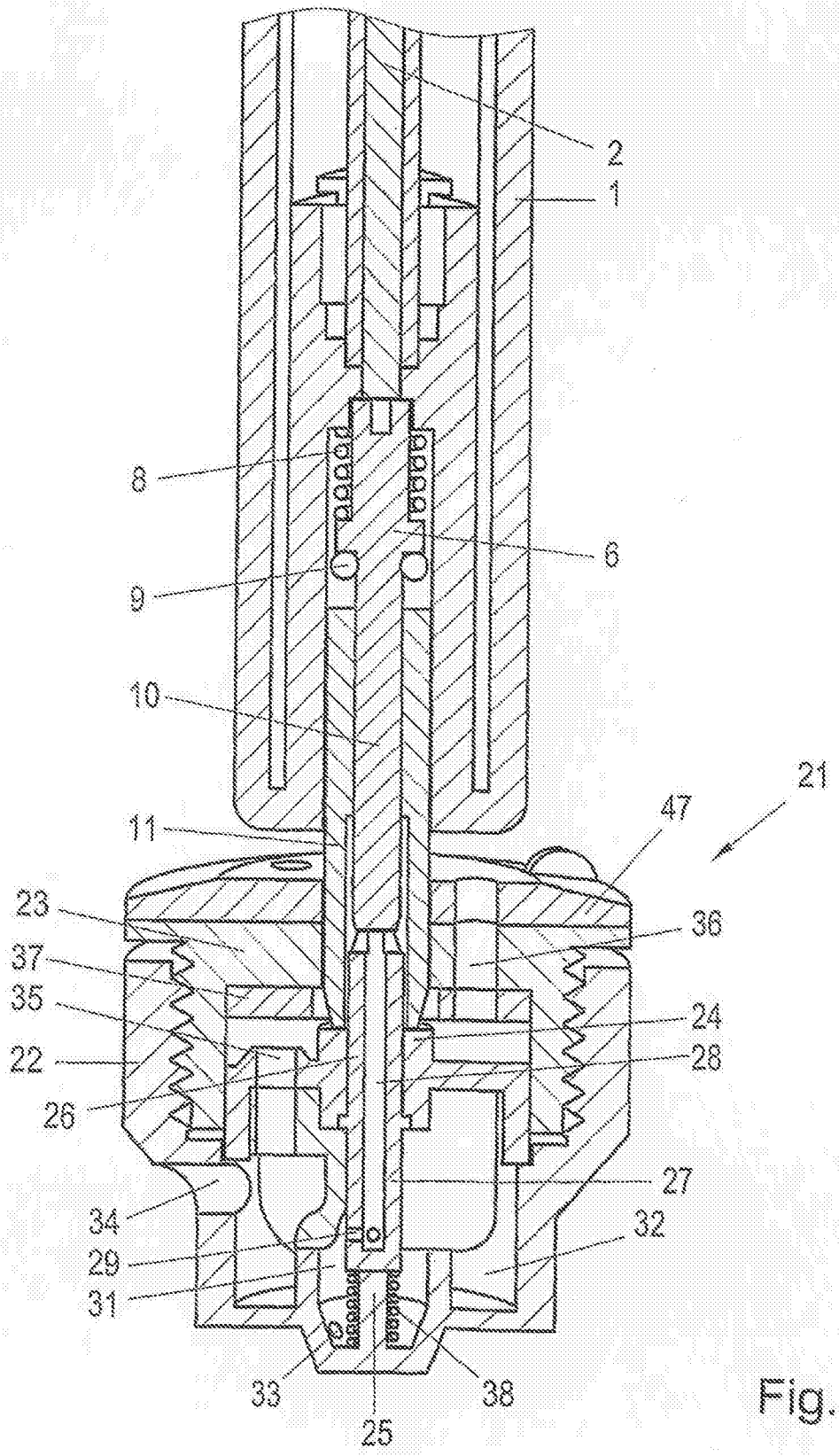


Fig. 16

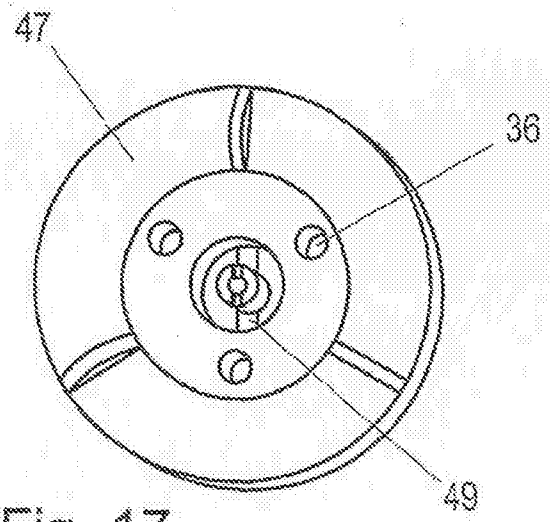


Fig. 17

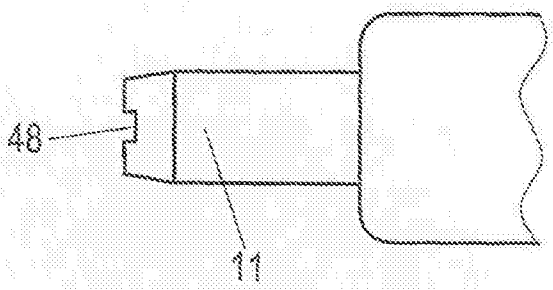


Fig. 18

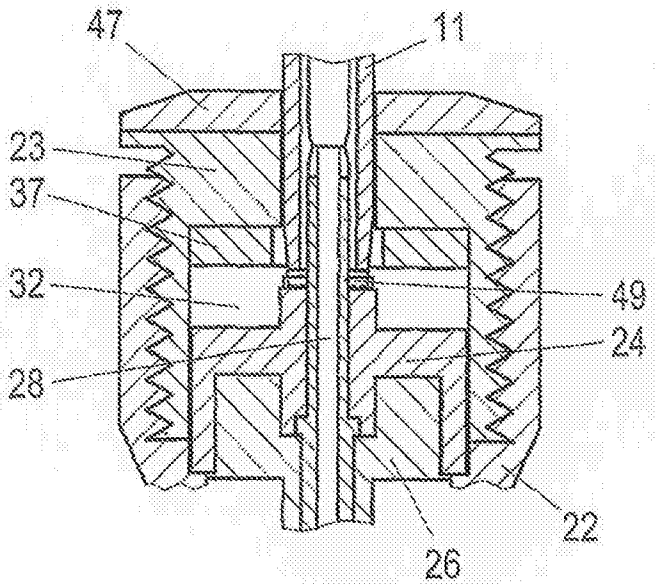


Fig. 19

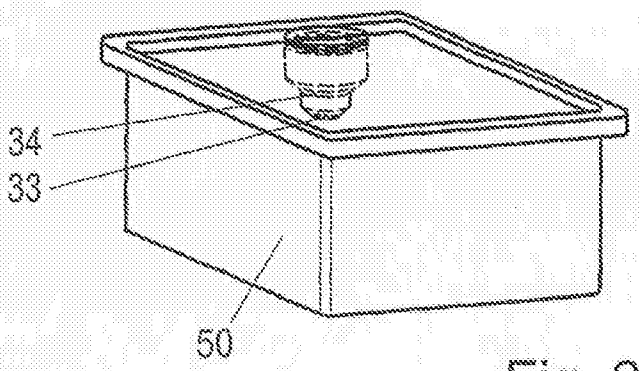
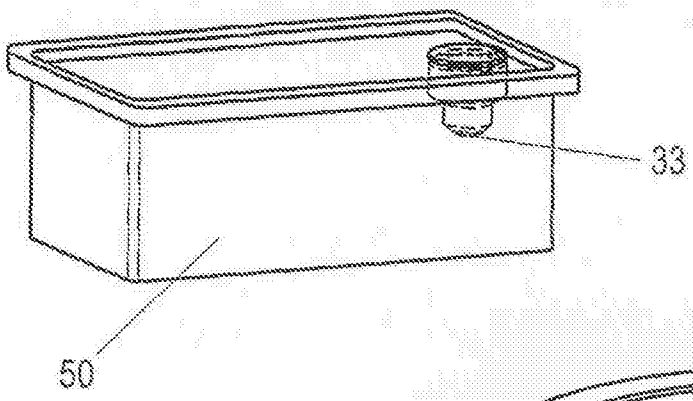


Fig. 21a

Fig. 21b



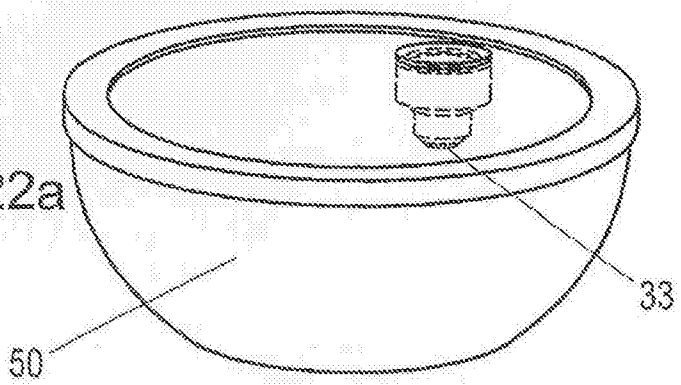


Fig. 22a

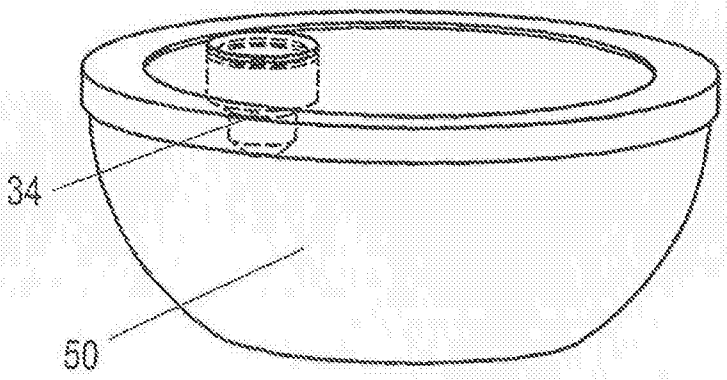


Fig. 22b

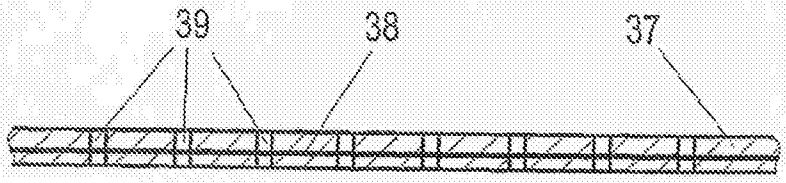


Fig. 23

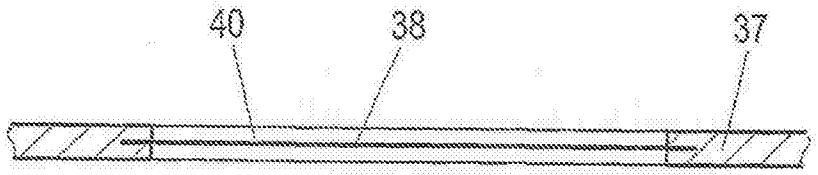


Fig. 24

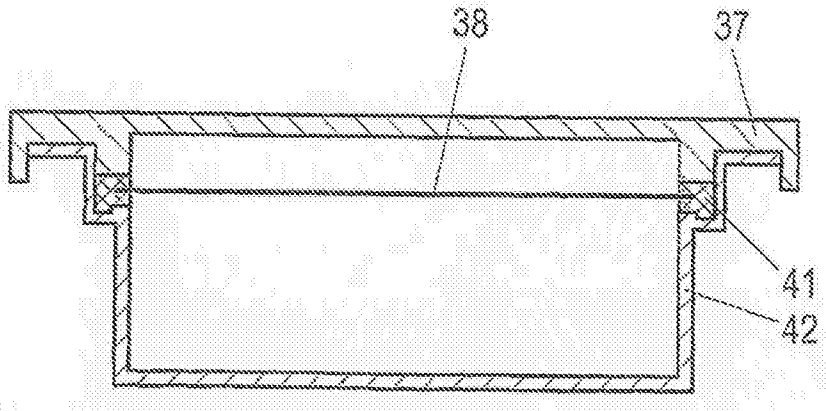


Fig. 25

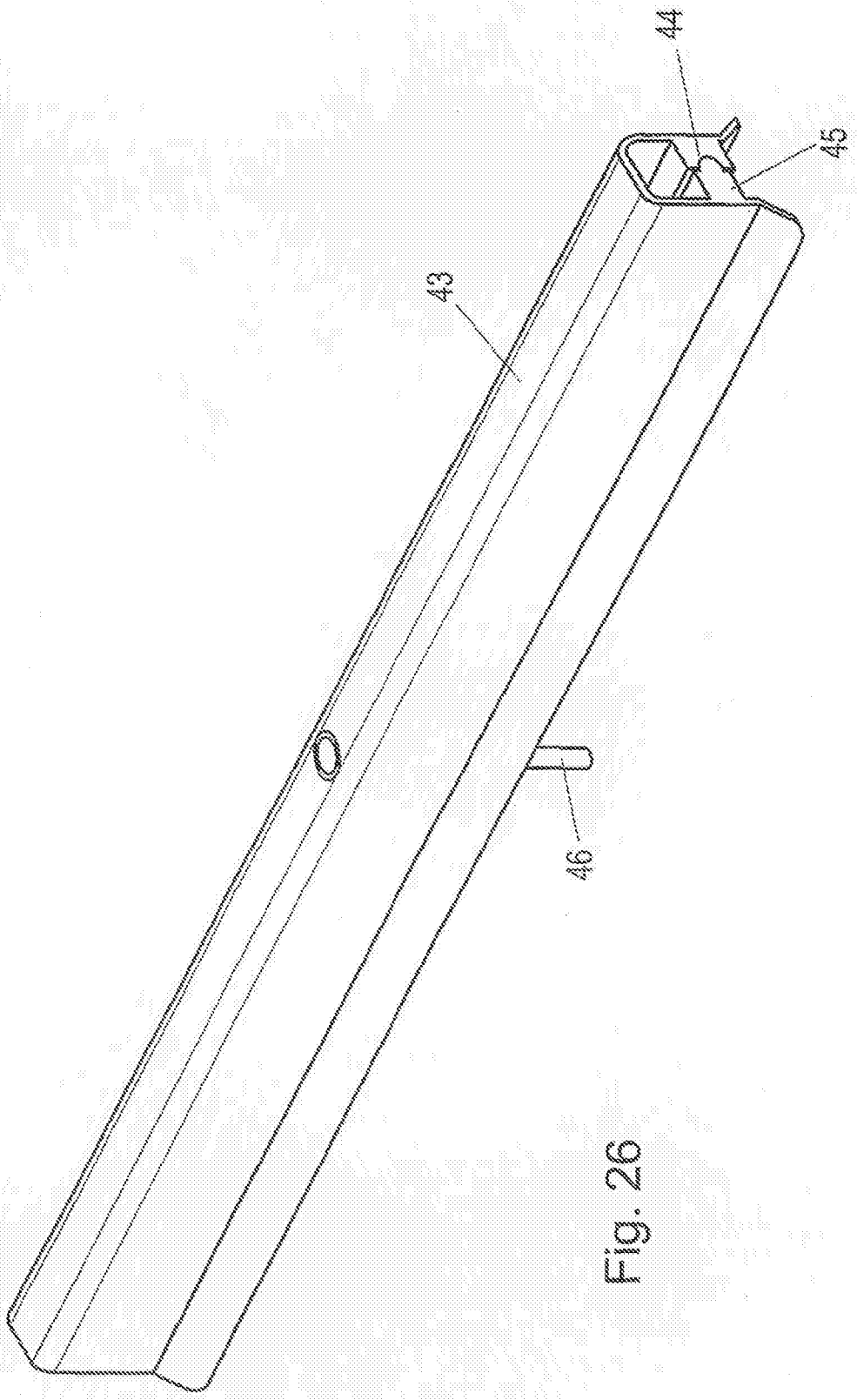


Fig. 26

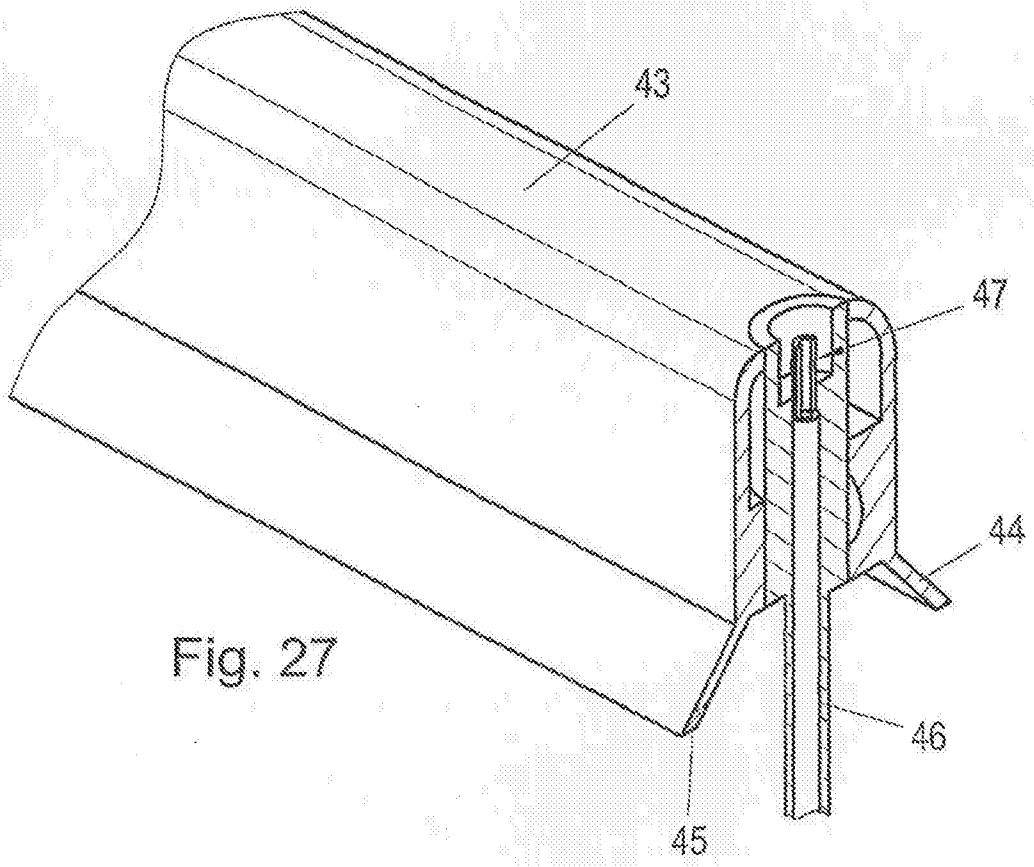


Fig. 27

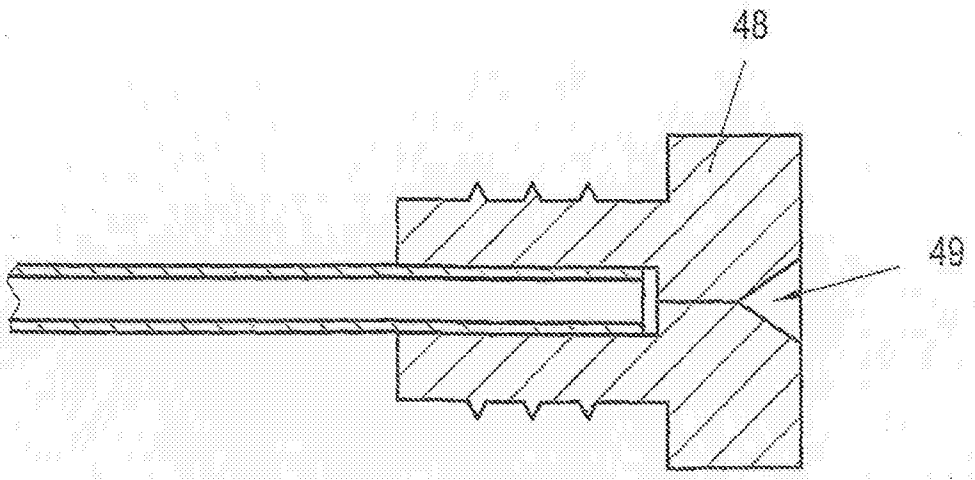


Fig. 28

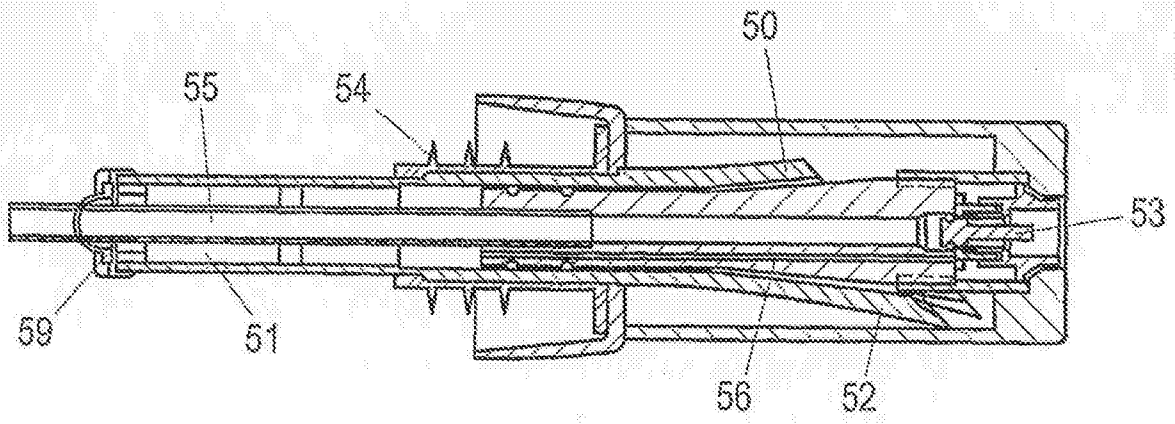


Fig. 29

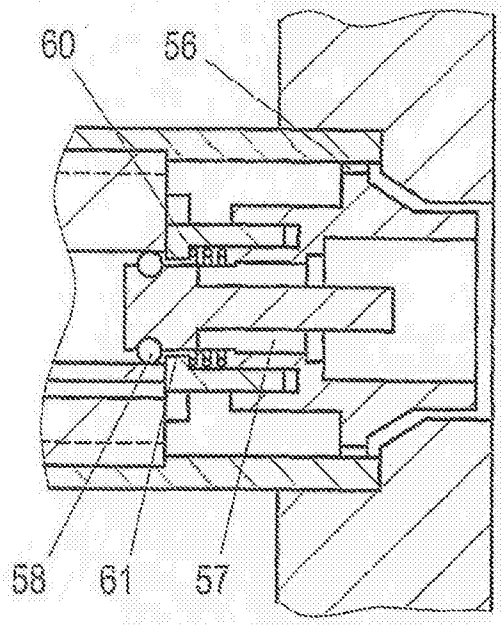


Fig. 30

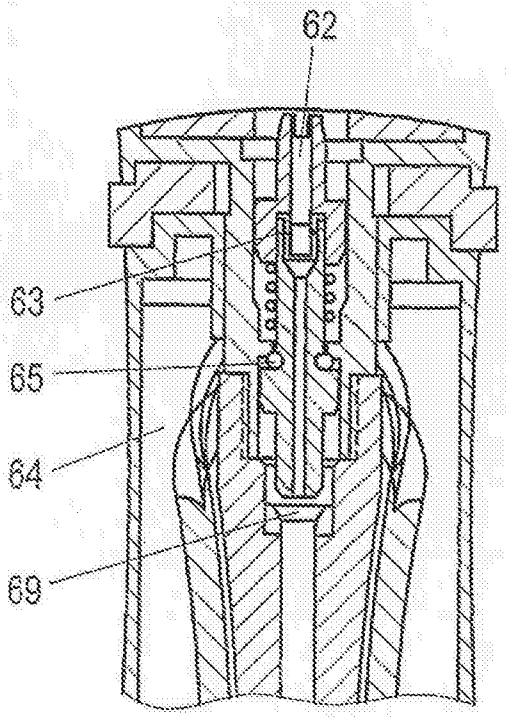


Fig. 31

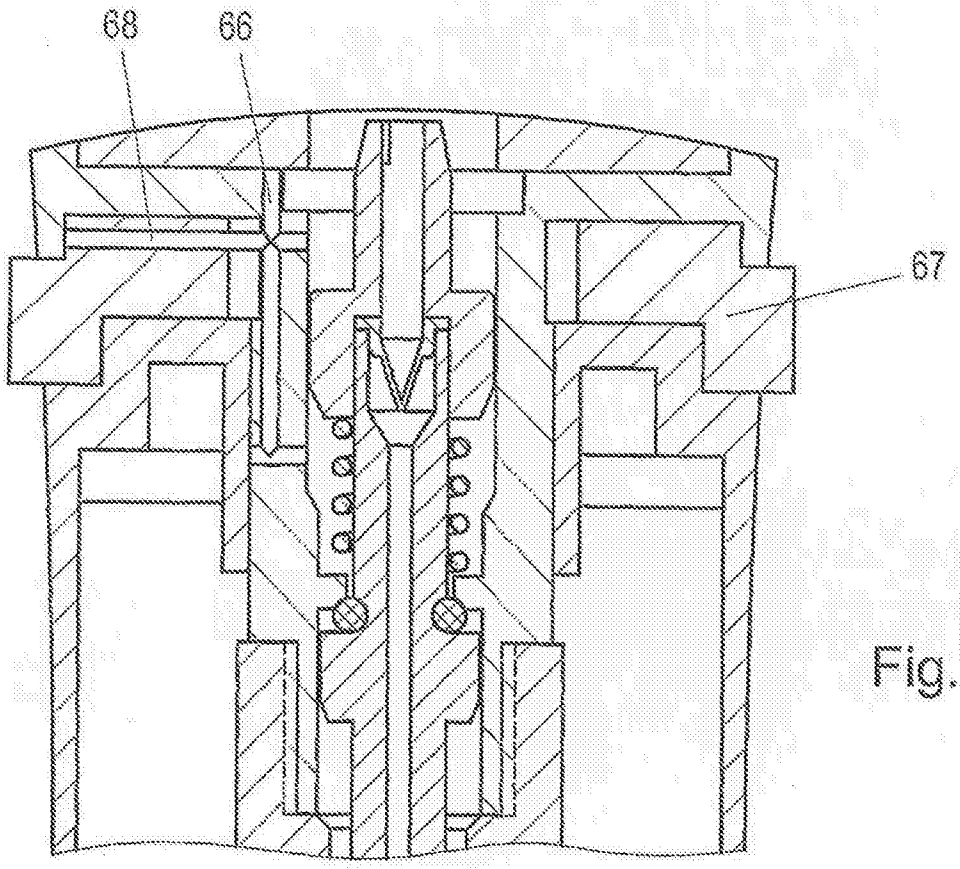


Fig. 32

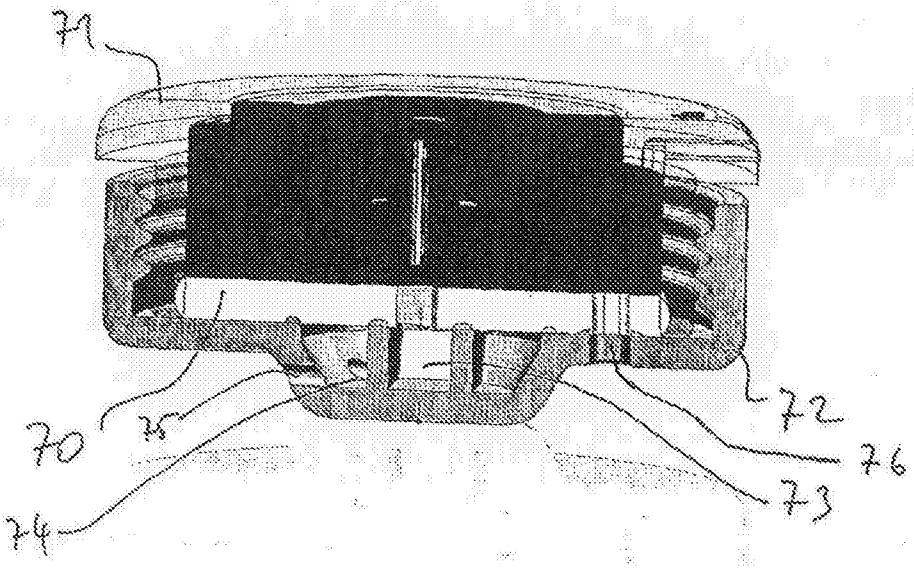


Fig. 33

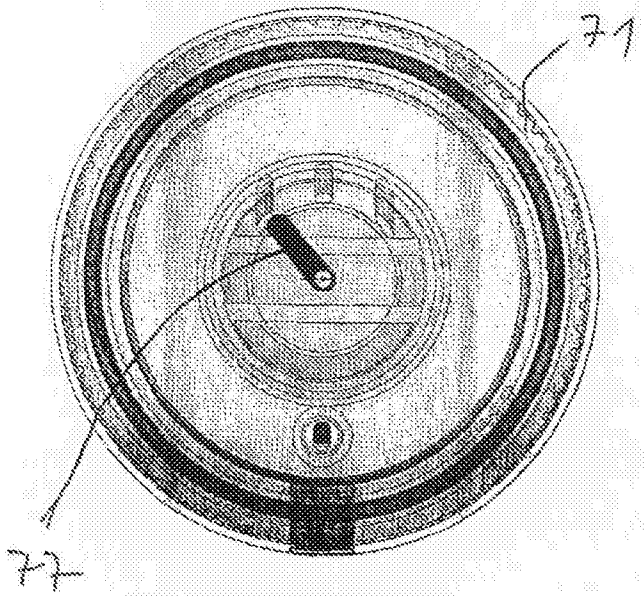


Fig. 34

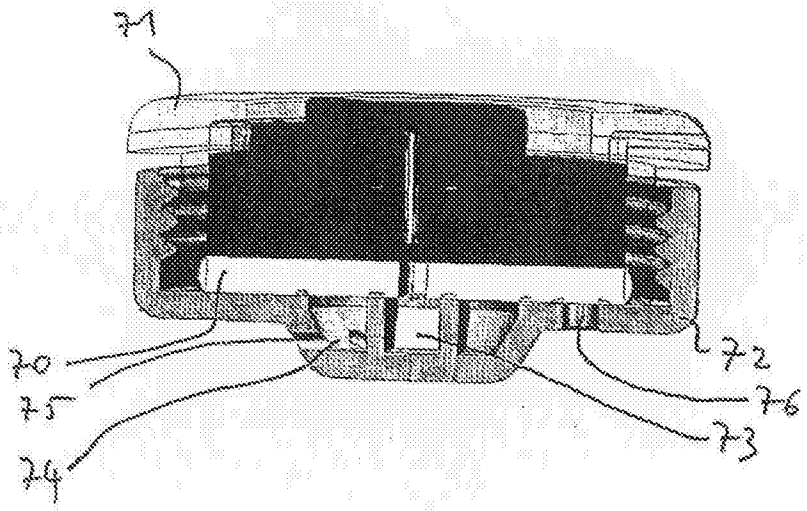


Fig. 35

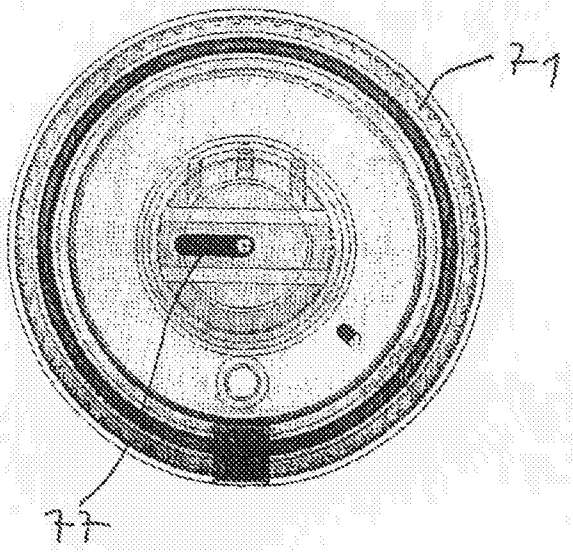


Fig. 36