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(54) **Closing/replenishment device for the tank of a steam apparatus**

(57) Closing/replenishment device for the tank (30) of a steam apparatus (100), comprising a funnel element (16) with an outlet mouth (17). The outlet mouth (17) is able to be associated with an access mouth (31) of the

tank (30). The closing/replenishment device also comprises closing means (18) of the float type suitable to cooperate with the outlet mouth (17) of the funnel element (16).

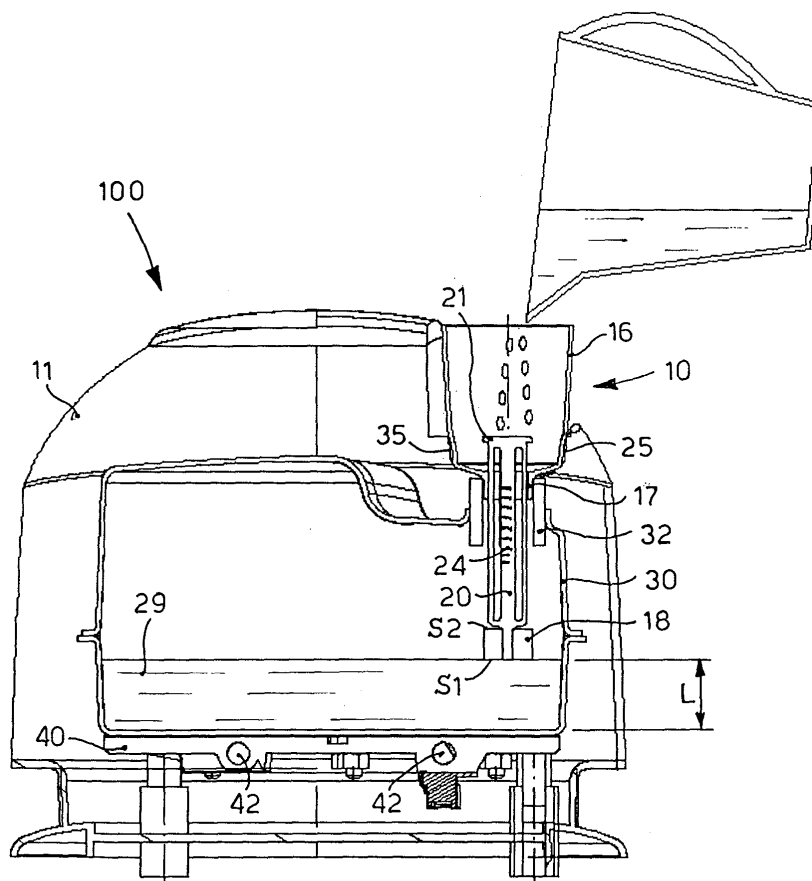


fig. 1

## Description

### FIELD OF THE INVENTION

**[0001]** The present invention concerns a closing/replenishment device for a tank, preferably but not only used to introduce/top up water in a steam apparatus, for example an apparatus for ironing garments or fabrics in general, of the type provided with a tank containing water, or boiler, for the production of steam.

### BACKGROUND OF THE INVENTION

**[0002]** Apparatuses for ironing fabrics are known, which comprise a steam iron and a tank containing water, or boiler, provided inside or outside the steam iron, and able to feed to the latter the water used to produce steam.

**[0003]** The tank is filled/topped up after use by introducing water inside it through a mouth provided for the purpose and closed during use by a sealing stopper. The mouth normally comprises a profile flared toward the inside of the tank, for example shaped like a truncated cone, so as to define a funnel shaped path to promote the introduction of water into the tank.

**[0004]** One disadvantage of known apparatuses is that the mouth used to fill the tank, since it has limited transverse sizes, prevents a direct inspection and verification of the level temporarily reached. Therefore, the introduction of water is periodically and frequently interrupted so as to verify visibly, through the mouth, the level reached so as to prevent unwanted leakages of water that can occur when the tank is completely filled. When the tank is provided with a semitransparent casing it is in any case better to make a continual and accurate verification both of the level reached and also of the correct introduction of the water through the mouth. This entails inefficiency in the use of the apparatus and a consequent waste of energy, since, during the filling of the tank, the ironing apparatus is disconnected from the electric feed, which entails a partial cooling of the water still in the tank: the longer the time taken to fill/top up the tank, the greater the cooling will be.

**[0005]** Furthermore, if the quantity of water in the tank is not optimum, there will not be an efficient production of steam, with a consequent formation of "wet" steam and/or with less energy efficiency.

**[0006]** Purpose of the present invention is to achieve a closing/replenishment device for a tank of a steam apparatus which allows to fill said tank easily and quickly to an optimum level for its functioning, preventing unwanted leakages of water outside the tank and preventing the introduction of a quantity that is too low to obtain good energy efficiency.

**[0007]** The Applicant has devised, tested and embodied the present invention to overcome the shortcomings of the state of the art and to obtain these and other purposes and advantages.

## SUMMARY OF THE INVENTION

**[0008]** The present invention is set forth and characterized in the independent claim, while the dependent claims describe other characteristics of the invention or variants to the main inventive idea.

**[0009]** In accordance with the above purpose, a closing/replenishment device for a tank according to the present invention is applicable for example to a boiler of a steam apparatus, such as for example an apparatus for ironing garments or fabrics in general.

**[0010]** The closing/replenishment device according to the present invention is conformed substantially as a funnel, and its outlet mouth can be associated with an inlet mouth of the tank.

**[0011]** According to a characteristic feature of the present invention, the closing/replenishment device comprises closing means of the float type, suitable to cooperate with the outlet mouth of the funnel shaped element.

**[0012]** According to the invention, the closing/replenishment device has a first storage position and a second position for the desired filling of the water tank.

**[0013]** It is in the spirit of the invention that, in the second filling position, the closing/replenishment device has a first delivery condition in which it allows water to be introduced into the tank, and a second closed condition, in which it prevents water from being introduced into the tank once the desired level of filling has been reached.

**[0014]** According to a variant of the present invention, the closing means are associated or can be associated with reference gradations in order to provide, during use, an indication of the level of filling reached during the replenishment of water into the tank.

**[0015]** According to another variant of the present invention the funnel element comprises at least a part suitable to ensure a stable positioning during the step when the water is loaded.

**[0016]** The present invention also concerns a steam apparatus for ironing garments or fabrics in general having a tank containing water and a corresponding inlet mouth through which the water is introduced into the tank and provided with a closing/replenishment device according to the present invention.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0017]** These and other characteristics of the present invention will become apparent from the following description of a preferential form of embodiment, given as a non-restrictive example with reference to the attached drawings wherein:

- fig. 1 is a schematic sectioned view of a closing/replenishment device for a steam apparatus according to the present invention in a first working configuration;
- fig. 1a is a schematic sectioned view of the closing/

replenishment device in fig. 1 in an intermediate working configuration;

- fig. 2 is a schematic sectioned view of the closing/replenishment device in fig. 1 in a second working configuration;
- fig. 3a is a schematic perspective view of the closing/replenishment device in fig. 1;
- fig. 3b is a schematic perspective view of a first element of the steam apparatus coupled with the closing/replenishment device in fig. 3a;
- fig. 3c is a schematic perspective view of a second element of the steam apparatus coupled with the closing/replenishment device in fig. 3a.

#### DETAILED DESCRIPTION OF A PREFERENTIAL FORM OF EMBODIMENT

**[0018]** With reference to the attached drawings, a closing/replenishment device 10 according to the present invention comprises a funnel element 16 able to be associated with a tank 30, in order to fill/top up the tank 30. In the solution shown, the device is associated with an ironing apparatus 100, but the invention also concerns use for other types of apparatus, for example vacuum cleaners, room humidifiers or others.

**[0019]** The ironing apparatus 100 comprises a casing 11 containing the tank 30, which has an inlet mouth 31 for access and a coupled nipple 32 connecting with the funnel 16. The apparatus 10 also comprises a heating plate 40, substantially flat, disposed below and in direct contact with the tank 30. The plate 40 comprises electric resistances 42 suitable to heat the water introduced into the tank 30 for the subsequent production and delivery of steam from a steam iron, not shown in the drawings since it is not essential for the description of the present invention.

**[0020]** The funnel element 16 comprises, at a lower end, a small tube, or outlet mouth 17, having a through cavity 19 suitable for the water to flow through. The tube 17 can be inserted, by means of mechanical coupling with the nipple 32, into said mouth 31. The tube 17 has an internal diameter of a size suitable to allow a sufficiently rapid outflow during the transfer of water to the tank 30.

**[0021]** The funnel element 16 is also integrally associated with a float 18, made for example of plastic, rubber or other suitable material, having a cylindrical shape and mechanically coupled, substantially coaxial, with a rod 20 in correspondence with an upper face S1 of the float 18. The rod 20, also made for example of plastic material, is able to slide axially in the cavity 19 of the tube 17 so as to dispose itself in at least a closed position (fig. 1a) in which it is disposed in such a manner that the upper face S1 of the float 18 is in contact with an exit hole of the water from the tube 17, so as to completely obstruct said hole. The rod 20 is also able to slide axially in the tube 17 so as to dispose itself in at least a delivery position, in which the upper face S1 of the float 18 is kept

separate from said exit hole, so as to allow, when the funnel element 16 is disposed with the tube 17 inserted in the nipple 32, the water to flow inside the cavity 19.

**[0022]** The rod 20 also comprises shafts 23 rounded at their terminal ends and disposed parallel in a direction substantially coinciding with a longitudinal axis of the tube 17. The shafts 23 are co-planar and define a transverse bulk smaller than the diameter of the cavity 19, so as to allow the rod to slide in said cavity 19, without interfering with the flow of water in the tube 17. One end 21 of the rod 20 comprises a head 22, the lateral size of which is greater than the diameter of the cavity 19, so as to interfere with a mouth of the cavity 19 and prevent the rod 20 from sliding and/or coming out from the tube 17.

**[0023]** The shafts 23 also comprises horizontal reference marks 24 suitable to provide an indication of an intermediate filling level of the tank 30 during the transfer of water.

**[0024]** The funnel element 16 also comprises a first external surface 25 having a shaping able to cooperate with a mating, substantially concave shaping of a second surface 35 of the apparatus 10, associated with the mouth 31. In this way it is possible to dispose the funnel element 16 stably balanced in a loading position (fig. 1), in which the lower face S2 of the float is disposed in contact with the free surface 29 of the water contained in the tank 30, allowing the rod 20 to slide in the cavity 19 of the tube 17. In the loading position, any possible transverse forces produced during the introduction of water into the funnel are contrasted by the coupling of the first surface 25 and the second surface 35.

**[0025]** The funnel element 16 also comprises an internal surface, substantially coinciding with an internal surface portion, which contains and allows the water to flow, mating with an external surface of an insert 36 of a stopper 37 that closes the mouth 31. The funnel element 16 can therefore be positioned in a covering position in which it is disposed upside down to cover the insert 36 and therefore the mouth 31 and the stopper 37. In the covering position the internal surface portion cooperates with shaped fins 38 (figs. 3b, 3c) of the insert 36, while the float 18 and the rod 20, disposed in its closed position, are housed in a second cavity 39 of the insert 36. In this way the funnel element 16, when not used for loading water into the tank 30, is stably applied to the apparatus 100 so as to prevent any difficulties in locating it.

**[0026]** The closing/replenishment device 10 as described heretofore functions as follows.

**[0027]** During ironing or when the ironing apparatus 100 is not in use, the funnel element 16 is disposed in its covering position.

**[0028]** When the level of water in the tank 30 goes below a predetermined value, signaled by a marker of a known type, not shown in the drawings, in order to fill/top up the tank 30 the insert 36 and the stopper 37 are removed and the funnel 16 is positioned in its loading position (fig. 1). In this way the rod 20 slides for at least part of its length in the tube 17 until it takes the lower face S2

of the float 18 into contact with the free surface 29 of the water in the tank 30. The head 21 prevents the rod 20 from coming out of the cavity 19 of the tube if the level L of water in the tank 30 is such that it does not allow contact between the surface S1 of the float 18 and the free surface 29.

**[0029]** The water is transferred inside the tank 30 continuously and without interruptions in order to make possible verifications of the level, since the float 18 in contact with the free surface 29 makes the rod 20 rise into the cavity 19, keeping it in its open position and allowing the water introduced through the tube 17 to flow out. When a predetermined final level  $L_F$  has been reached, such as for example when the tank 30 is full, the rod 20 is disposed in its closed position where the float 18 is disposed with its first face S 1 in contact with the exit hole of the tube 17, in practice closing it, and thus preventing any further introduction of water.

**[0030]** When it is not necessary to fill the tank to the final level  $L_F$  it is possible to verify the intermediate level of the tank 30 by means of a visual inspection of a predetermined reference marker 24 of the rod 20 during its progressive vertical slide determined by the rising of the float 18.

**[0031]** When filling/top up operation is complete, the stopper 37 and the relative insert 36 are repositioned to cover the mouth 31 and the funnel element 16 is again disposed in its covering position.

**[0032]** It is clear that modifications and/or additions of parts may be made to the closing and replenishment device 10 for a tank as described heretofore, without departing from the field and scope of the present invention.

**[0033]** It is also clear that, although the present invention has been described with reference to some specific examples, a person of skill in the art shall certainly be able to achieve many other equivalent forms of closing and replenishment device 10 for a tank, having the characteristics as set forth in the claims and hence all coming within the field of protection defined thereby.

## Claims

1. Closing/replenishment device for the tank (30) of a steam apparatus (100), advantageously but not exclusively associated with a steam iron, comprising a funnel element (16) having an outlet mouth (17) able to be associated with an access mouth (31) of said tank (30), **characterized in that** it comprises closing means (18) of the float type able to cooperate with said outlet mouth (17) of the funnel element (16).
2. Device as in claim 1, **characterized in that** it has a first storage position and a second position for the desired filling of the water tank (30).
3. Device as in claim 2, **characterized in that** in said second filling position it has a first delivery condition,

in which it allows water to be introduced into the tank (30) and a second closed condition, in which it prevents water being introduced into the tank (30) when the desired filling level is reached.

4. Device as in claim 3, **characterized in that** the float type closing means (18) are integrated in said funnel element (16) and are autonomously mobile between at least a first position, corresponding to said delivery condition in order to introduce water into the tank (30), and a second position, corresponding to the closed condition, when a predetermined filling level ( $L_F$ ) of water into said tank (30) is reached.
5. Device as in claim 4, **characterized in that** said filling level ( $L_F$ ) is a maximum filling level.
6. Device as in any claim hereinbefore, **characterized in that** it comprises a rod-like element (20), coupled with said closing means (18), and able to slide in the outlet mouth (17) so as to guide said closing means (18) in an axial direction coinciding with a longitudinal axis of said outlet mouth (17).
7. Device as in claim 6, **characterized in that** said rod-like element (20) comprises reference gradations (24) able to provide an indication during use of a filling level (L) during the replenishment of water into said tank (30).
8. Device as in any claim from 2 to 7, **characterized in that** the funnel element (16) comprises at least a part suitable to ensure a stable positioning during the loading of water into the tank (30).
9. Device as in claim 5, **characterized in that** it comprises a first external surface (25) having a shaping able to cooperate with said access mouth (31) and/or with a second surface (35) of said steam apparatus (100), in order to ensure a stable positioning of said funnel element (16) during the loading of water into the tank (30).
10. Steam apparatus, advantageously but not exclusively associated with a steam iron, comprising a tank (30) containing water and a corresponding mouth (31) for the introduction of water, **characterized in that** it comprises a closing/replenishment device (10) for said tank (30) as in any claim from 1 to 9.

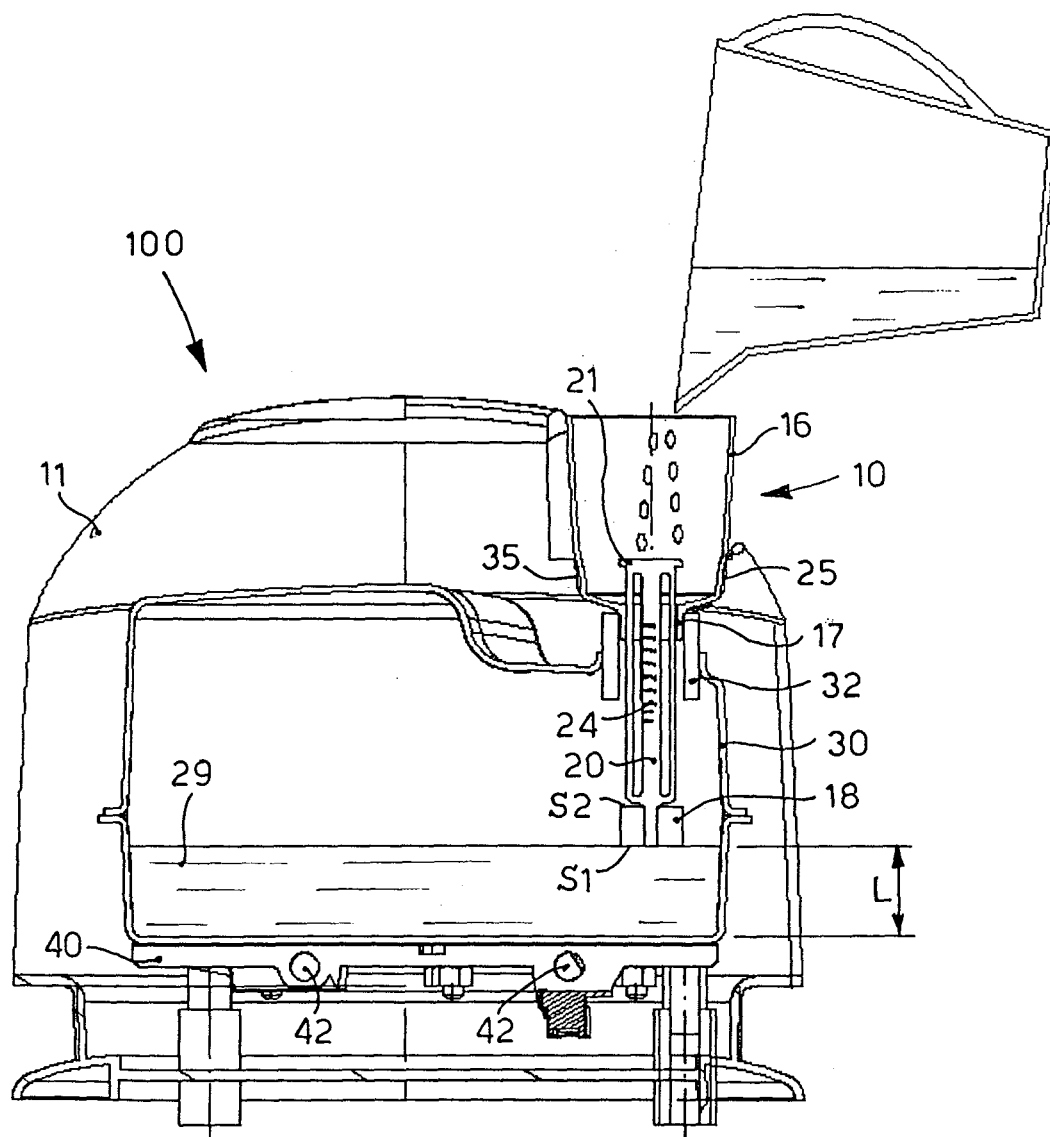


fig. 1

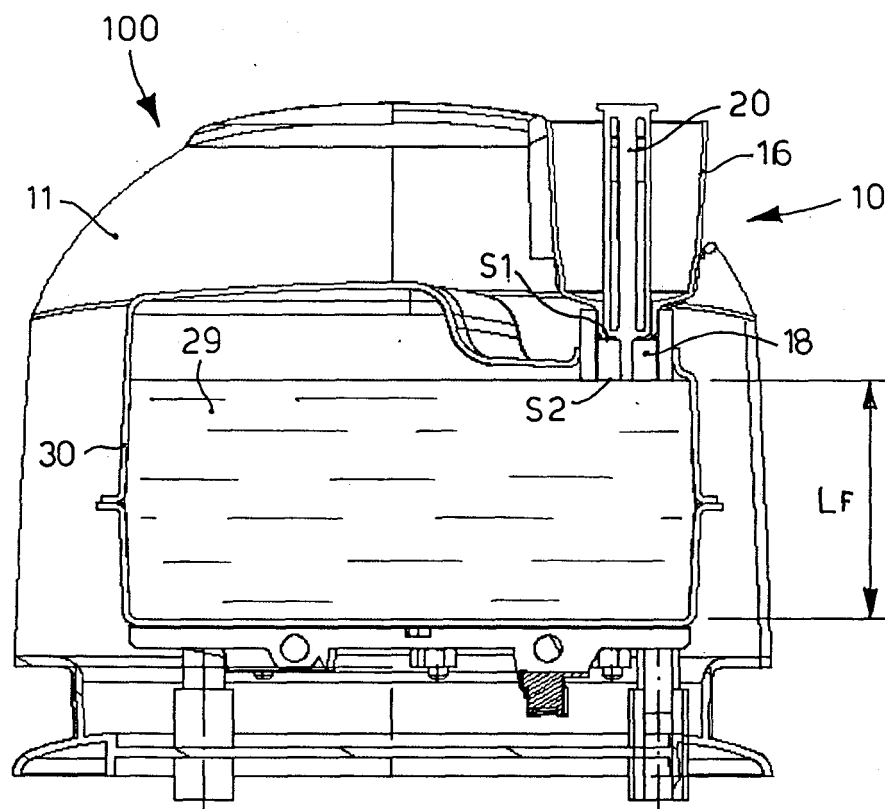


fig. 1a

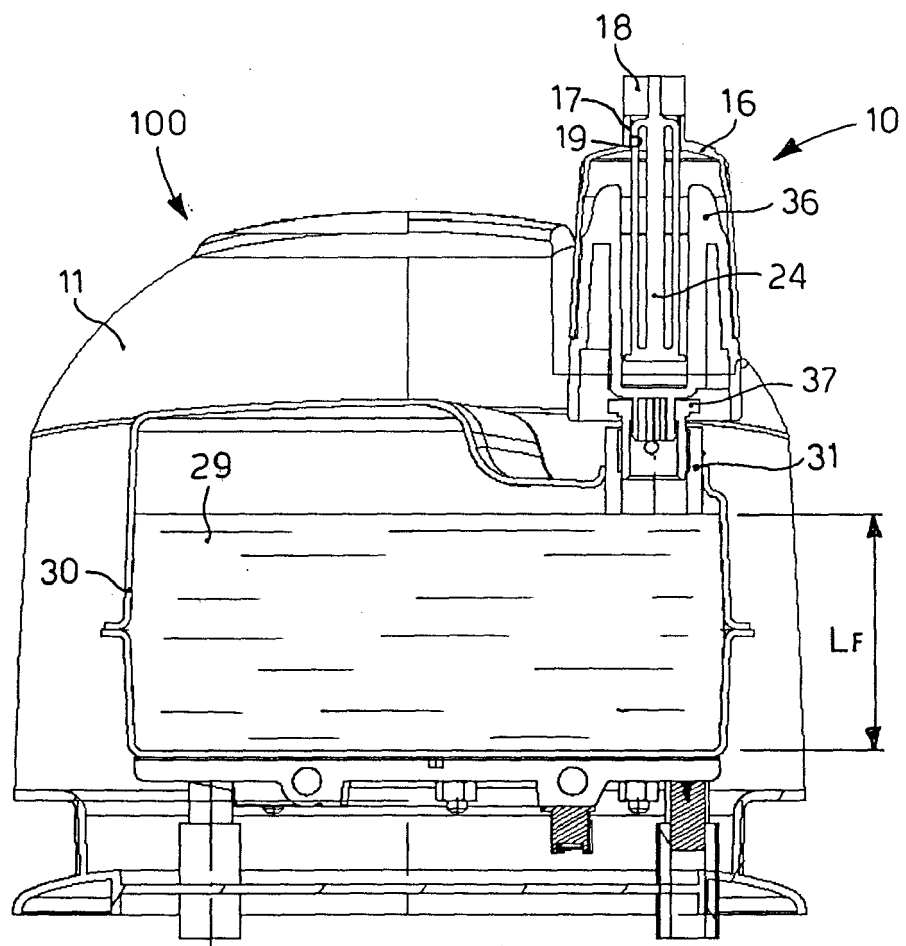


fig. 2

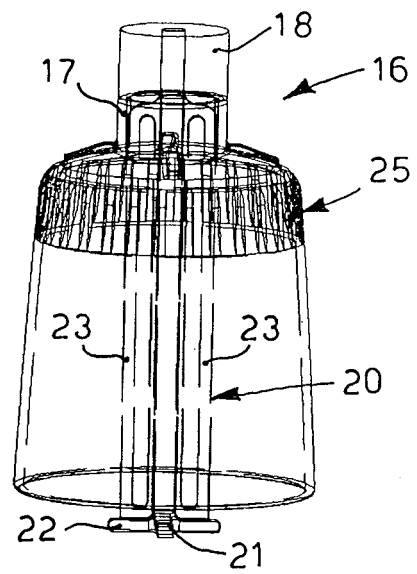


fig. 3a

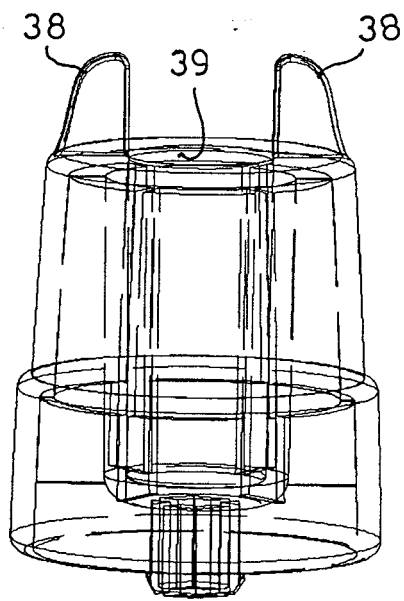


fig. 3b

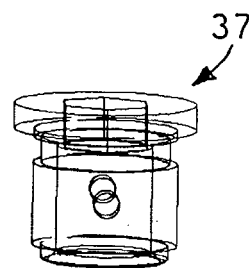


fig. 3c





## EUROPEAN SEARCH REPORT

Application Number  
EP 09 15 7065

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The present search report has been drawn up for all claims			
Place of search <b>Munich</b>		Date of completion of the search <b>28 July 2009</b>	Examiner <b>Spitzer, Bettina</b>
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons</p> <p>&amp; : member of the same patent family, corresponding document</p>			

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**ANNEX TO THE EUROPEAN SEARCH REPORT  
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
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