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(54) Benævnelse: **Belysningsindretning, som anvender flydende brændstof**

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DE-A1-102008 063 267
GB-A- 189 414 924

DESCRIPTION

[0001] The invention refers to a lighting device employing liquid fuel, in particular liquid paraffin, paraffin oil or a similar fuel in the form of a compound on the basis of saturated hydrocarbons, optionally including essential oils and aromas and/or other preparations, wherein such fuel is stored inside of each lighting device. Such lighting device generally serves for decorative purposes, but can optionally in certain cases also be used as a grave candle or a backup lantern, for example, when there is no electricity available. According to the International Patent Classification such inventions belong to the class F 21 V 37/00.
The invention is rest on a problem of designing a lighting device employing liquid fuel of a previously mentioned type, wherein on one hand leakage of fuel would be prevented from the interior of the lighting device towards the exterior during transport or tipping during at least a specified and in advance known time period, and on the other hand also any establishment of oral contact with a wick and sucking out fuel from the interior of the lantern would have to be prevented.
Lighting devices employing liquid fuel are generally known, and one of them is described in DE 102 10 955 A1 and DE 201 04 766 U1 respectively. Document DE 10 2008 0630267 A1 discloses the preamble of claim 1. EP 2 136 130 A1 and GB 189414924A show other lighting devices employing liquid fuel.

[0002] It also is known that liquid fuels, which are suitable for being used in such lighting devices, are harmful in case of ingestion. Especially in cases when such lighting device is used for decorative purposes, it is usually located inside i.e. in the room and can generally be accessible to children. In such cases it is usually not possible to completely discard the possibility of a child trying to suck fuel out of the lighting device, which could have severe consequences on the health of the child. Said possibility of sucking out fuel has obviously not been taken into account in the previously mentioned lighting device according to DE 102 10 955 A1 and DE 201 04 766 U1 and still remains completely unsolved. On the other hand, said known lighting device takes care about the possibility of fuel leaks at least during transporting of an unused device. The lighting device namely comprises a fuel container, which is fitted with a sealed cover, which also has a function of a burner and is therefore furnished with two openings. A wick is placed within the first opening, wherein the first end portion thereof is arranged inside of the container and is saturated by each fuel, while its second end portion is arranged outside of the lighting device and allows burning said fuel supplied by means of the wick. The second opening on the cover serves as an aerating opening, which eliminates pressure differences, which would otherwise occur during the burning of the fuel between the internal pressure inside of the container and the external pressure due to reduction of volume of fuel inside of the container, which would make the transport of fuel along the wick totally impossible. In order to prevent leakage of the fuel through anyone of said openings at least during transporting of such lighting device, the last is furnished with a seal, which is placed over the cover and needs to be removed prior to and during the use of the lighting device, since otherwise the lighting device could not function. However, it is quite possible that for various possible reasons the lighting device is tipped over during the use, wherein in such case

said fuel leakage is not prevented in any way, even not for a shortest possible time period after the change in the position of the lighting device, for example, at least for a time period, which is required by each user to notice such accident and to return the lighting device back to its regular operating position.

[0003] Amongst others, such known lamps due to their potential accessibility to children do not comply with the actual standard DIN EN 14059:2002 for decorative lighting devices. Namely, according to said standard, lighting devices must ensure such preventing fuel leakage towards the exterior for at least a time period of 30 s after the lighting device has been tipped over, and also to prevent children from sucking the wick on the burner.

[0004] It is known that the problem of fuel leakage through the wick opening has been solved by closing the opening in such manner that the wick was tightly compressed in the area of the opening. Despite to the mentioned precaution there is still a possibility of fuel leakage, namely through the remaining aerating opening.

[0005] The common problem with oil lighting devices and other lighting devices employing liquid fuel is namely that the volume of consumed oil in the container must be replaced with air. When this is not possible, negative pressure is formed inside of the container, upon which the required transporting of the fuel towards the burner is terminated, which results in extinguishing of the lighting device. In order to enable burning, such lighting device must therefore include an opening on the top, which allows airflow towards the interior of the fuel container. If the lighting device is tipped over, fuel starts to leak through this opening, as well as through the wick, which is unacceptable, especially when paraffin oil or other health hazardous fuel are used. Fuel leaks through the wick have thus far been relatively effectively prevented by means of tight compression of the wick on the burner, however there were no appropriate construction solutions, which would prevent fuel leakage through the aerating opening.
The requirements and problems regarding lighting devices, which are using oil, are further described in a technical article in »*BAM Pressemitteilung 10/07 vom 18. April 2007 - Gemenisame Presseinformation mit dem Bundesinstitut für Risikobewertung (BtR)*« with the title »*Kindersichere Öllampen sind möglich*!« Despite a relatively complicated technical approach in the direction of preventing sucking of fuel, the problem of preventing fuel leakage by tipping over a lighting device still remains unsolved.
According to the invention, a lighting device employing liquid fuel is proposed, which comprises at least a container, which is arranged to receive and store liquid fuel, as well as a burner, which at the same time serves as a lid, by which said container is tightly sealed. Said burner includes a wick, the first end portion of which is located inside of the container in a way that it is allowed to absorb said liquid fuel, while its second end portion passes through the burner and protrudes out from the container. The burner further comprises, in addition to a tube, through which extends said the wick and which passes from the inside of the container to the outside, also an additional opening for aeration of the interior of the container and thus equalising the air pressure inside of the container due to varying of the amount of fuel therein. According to the invention it is further proposed, that the container of the lighting device is furnished with a neck, in the area of which the burner is placed, which is conceived as a hollow lid and

comprises a reservoir for the fuel which is possibly leaked from the interior of the container, wherein the said reservoir is located above the highest allowed level of the fuel within the container. The burner with accompanied reservoir is on the one hand suitable for closing and sealing the container in the area of its neck, and on the other hand for receiving any fuel, which could be leaked from the container, if the lantern would be tipped over. Said burner is moreover on the external surface of the container surface furnished with an outwardly protruding tubular rib in the form of a continuous ring, which extends at sufficient distance around the wick and serves to prevent any oral contact with said second end portion of the wick, which is located outside of the container. Furthermore, said reservoir of the burner also comprises a top wall, which is located outside of the container, so that said protective tubular rib is arranged on the external surface of said top wall, as well as a bottom wall, which is located inside of the container, and a side wall, which is located between said bottom wall and top wall. According to the invention, another embodiment is foreseen, in which said tube is sealed both in the area, where it passes through the top wall towards the bottom wall, and also in the area, where it passes through the bottom wall towards the top wall of the reservoir.

[0006] Furthermore, the aeration opening in the top wall of the reservoir is arranged at a distance apart from said centrally aligned tube comprising a wick, and at the same time an aeration tube is connected to the aeration opening, wherein the airing tube is used to enable the airflow from the exterior of the container towards the interior, or vice versa, and is extending towards the bottom wall and ends at a sufficient distance apart from the bottom wall. The bottom wall of the reservoir is furnished with a further opening, which allows the airflow from the interior of the container into the reservoir, or vice versa, and also to allow the fuel to flow from the interior of the container into the reservoir, or vice versa, respectively.

[0007] According to one of the embodiments of the invention, the mentioned opening in the bottom wall of the reservoir is arranged coaxially with said tube, wherein the tube passes through the mentioned opening by maintaining sufficient space there-between.

[0008] According to a still further embodiment of the invention said opening in the bottom wall of the reservoir is arranged adjacent to the side wall of the reservoir, preferably on the opposite side of the ventilation opening with the belonging tube with respect to said centrally arranged tube with wick. The fuel level before and during the regular use should be below the bottom wall of the reservoir.

[0009] As said tube, through which the wick is inserted, either a metallic tube or a non-metallic tube, for example a ceramic tube, can be used. The cover wall, side wall and the bottom wall of the reservoir may optionally consist of a synthetic material or any other material, which is suitable for this purpose.

[0010] The invention will be described on the basis of embodiments, which are schematically presented in the attached drawings, wherein

Figs. 1 and 2

show longitudinal cross sections along a diametric plane of a lighting device employing liquid fuel;

Figs. 3 to 5

show said lighting device in three typical positions during irregular use thereof, namely when rotated for around 90°, around 135° and around 180° in with respect to its position during its regular use as shown in said Figs. 1 and 2; and

Fig. 6

is a further embodiment of said lighting device employing liquid fuel, which is presented analogously as in Fig. 1.

[0011] In the embodiment of the invention according to Fig. 1 the lighting device employing liquid fuel comprises an at least essentially cylindrical container 1, which is suitable for receiving and storage of each liquid fuel 14, as well as a burner 7, which is functioning as a lid and is suitable for tightly sealing of said container 1. For this purpose the container 1 is on its end area, which is faced away from the base, furnished with a narrowed neck 4, in the area of which said burner 7 is arranged.

[0012] The burner 7 includes a wick 8, the first end portion of which is located in the interior of the container 1 in such a way that it is capable to absorb liquid fuel 14, while its second end portion passes through the mentioned burner 7 and protrudes out of the container 1. Similarly like in known lighting devices, the liquid fuel, in this particular embodiment a liquid paraffin, is by means of the wick 8 due to capillary effect transported from the interior of the container 1 towards the external second end portion of the wick, which in the area of the burner 7 protrudes outwardly from the container 1.

[0013] In addition to the tube 9, through which the wick 8 extends from the interior of the container 1 to the exterior thereof, said burner 7 comprises an additional opening 6 which serves for aeration of the interior of said container 1 and herewith also for equalising of the air pressure inside of the container 1. Otherwise, during the regular use the air pressure inside of the container 1 would change, since the fuel 14 is burning and consequently, quantity of the fuel 14 inside the container 1 is gradually changed.

[0014] The burner 7 is designed as a hollow lid, which comprises a reservoir 2 for those fuel 14, which is eventually leaked from the interior of the container 1, wherein said reservoir 2 is regularly located above the highest allowed level of the fuel 14 in the container 1, and wherein said burner 7 with the reservoir 2 is adjusted to close and seal said container 1 in the area of its neck 4, as well as to receive those fuel 14, which is leaked from container 1, when the lighting device is tipped over.

[0015] Said burner 7 is on the external surface of the container 1 furnished with an outwardly protruding protective tubular rib 10, which is designed as a circumferentially continuous ring, which extends around the wick 8 and at a distance apart from it, and which is intended for

preventing oral contact with the section of the wick 8 which is located outside of the container 1.

[0016] The reservoir 2 of the burner 7 comprises a top wall 15, which is located outside of the container 1 and on the external surface of which said protective tubular rib 10 is arranged, a bottom wall 13, which is located inside of the container 1, as well as a side wall 3, which is located between said bottom wall 13 and top wall 15. Besides, a tube 9 with a wick 8 inserted there-through is integrated within said reservoir 2 and passes in approximately central arrangement through the top wall 15 and the bottom wall 13, and is sealed either just in the area of the top wall 15 or both in the area of said top wall 15 and the bottom wall 13 of the reservoir 2.

[0017] An aeration opening 6 in the top wall 15 of the reservoir 2 is arranged at a distance apart from the said centrally aligned tube 9 comprising said wick 8. An aerating tube 5 is connected to said aeration opening 6, so that the aeration tube 5 enables the air to flow from the exterior of the container 1 towards its interior, or vice versa, and extends towards the bottom wall 13, where it is ended at a sufficient distance apart from the bottom wall 13, whereas the bottom wall 13 of the reservoir 2 is furnished with a further opening 12, which allows the fuel 14 to flow from the interior of the container 1 into the reservoir 2, or vice versa.

[0018] In the embodiment according to Fig.1, said opening 12 in the bottom wall 13 of the reservoir 2 is arranged adjacent to the circumferential wall 3 of the reservoir 2 and with respect to said centrally arranged tube 9 and the wick 8 inserted there-through oppositely to the aerating opening 6 with belonging tube 5.

[0019] In a further embodiment according to Fig. 6 said opening 12 in the bottom wall 13 of the reservoir 2 is arranged coaxially with the tube 9 in such way that the tube 9 passes through the opening 12 by maintaining sufficient gap therebetween.

[0020] Furthermore, the tube 9 together with said which wick 8 inserted there-through is preferably available a metallic tube. However, said tube 9 can generally consist of any other non-flammable non-metallic material, especially for example of ceramics.

[0021] The top wall 15, side wall 3 and the bottom wall 13 of the reservoir 2 preferably consist of synthetic material, but can also be manufactured of any other material suitable for this purpose.

[0022] The level of fuel 14 within the container 1 before and during regular use of the lighting device should always be below the bottom wall 13 of the reservoir 2, which must be established during the first filling of fuel 14 by the manufacturer, and also by every subsequent filling by each user. Thus, the air is enabled to enter the interior of the container 1 through the openings 6 and 12, which allows fuel 14 to be transported along the wick 8 towards the burner 7.

[0023] In the case of irregular use of the lighting device, for example by tipping-over the lighting device or upon that, the opening 12 in the bottom wall 13 is closed by the fuel 14, and the air is prevented from flowing into container 1. The fuel 14, which leaks outside of the container 1, is temporarily stored inside the reservoir 2 and can flow back into the container 1 as soon as the lighting device is returned into its operational position, i.e. its correct position of regular use.

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- DE10210955A1 **[0001] [0002]**
- DE20104766U1 **[0001] [0002]**
- DE102008063026 7A1 **[0001]**
- EP2136130A1 **[0001]**
- GB189414924A **[0001]**

PATENTKRAV

1. Belysningsindretning, som anvender flydende brændstof, hvilken indretning omfatter i det mindste én beholder (1), som er indrettet til at modtage og opbevare et flydende brændstof (14), samt en brænder (7), som også tjener som et låg, og som er egnet til tæt at forsegle beholderen (1) og omfatter en væge (8), hvis første endedel er placeret indvendigt i beholderen (1) på en sådan måde, at den tillades at absorbere det flydende brændstof (14), medens den anden endedel deraf stikker ud igennem beholderen (1) og passerer igennem brænderen (7), hvor brænderen (7) er forsynet med et rør (9), igennem hvilket vægen (8) er indsat med henblik på at strække sig fra det indre af beholderen (1) imod det ydre deraf, samt en yderligere åbning (6) til at udluft det indre af beholderen (1) og således at udligne lufttrykket indvendigt i beholderen (1) på grund af ændringer i mængden af brændstof (14) deri, hvor beholderen (1) omfatter en hals (4), i det område, hvor brænderen (7) er anbragt, som er udformet som et hult låg og omfatter et reservoir (2) til opbevaring af brændstoffet (14), som eventuelt lækker fra det indre af beholderen (1), hvor reservoiret (2) er placeret over det højst tilladte niveau for brændstoffet (14) i beholderen (1), og hvor brænderen (7), som er forsynet med reservoiret (2), er indrettet til både at lukke og forsegle beholderen (1) i området ved dennes hals (4), og også til at modtage brændstoffet (14), som kunne lække fra beholderen (1), hvis lanternen væltes, og hvor brænderen (7) yderligere på sin udvendige overflade udenfor beholderen (1) er forsynet med en udad udstikkende beskyttende rørribbe (10), som er udformet som en kontinuert ring, som strækker sig omkring vægen (8) og i en vis afstand fra denne og er beregnet til at forhindre mundkontakt med den anden endedel af vægen (8), som er placeret udenfor beholderen (1), og hvor reservoiret (2) i brænderen (7) omfatter en øvre væg (15), som er placeret udenfor beholderen (1) og på den udvendige overflade af hvilken den nævnte beskyttende rørkant (10) er anbragt, en bundvæg (13), som er placeret indvendigt i beholderen (1) samt en sidevæg (3), som er anbragt imellem bundvæggen (13) og den øvre væg (15), og yderligere, et rør (9) er tilvejebragt, som passerer igennem den øvre væg (15) og bundvæggen (13) i reservoiret (2), hvori vægen (6) er indsat og som er i det mindste omtrent centralt oprettet og forseglet i det mindste i området ved passage igennem den øvre væg (15) imod bundvæggen (13), og hvor bundvæggen (13) i reservoiret (2) er forsynet med en yderligere åbning (12), som er beregnet til at tillade brændstoffet (14) at strømme fra det indre af beholderen (1) ind i reservoiret (2) eller vice versa, hvor niveauet af brændstof (14) altid, under normal brug af belysningsindretningen og også før dette,

opretholdes under bundvæggen (13) i reservoiret (2), **kendetegnet ved, at** udluftningsåbningen (6) i den øvre væg (15) af reservoiret (2) er anbragt i afstand fra det nævnte centralt anbragte rør (9), som omfatter en væge (8), og samtidigt er et udluftningsrør (5) forbundet med udluftningsåbningen (6) og er egnet til at tillade luften af strømme fra omgivelserne for beholderen (1) imod det indre deraf, eller vice versa, hvor udluftningsrøret (5) stikker ud mod bundvæggen (13) men er afsluttet i en tilstrækkelig afstand fra bundvæggen (13).

2. Belysningsindretning ifølge krav 1, **kendetegnet ved, at** røret (9) er forseglet både i området ved dettes passage igennem topvæggen (15) imod bundvæggen (13), og også i området ved dettes passage igennem bundvæggen (13) imod topvæggen (15) i reservoiret (2).

3. Belysningsindretning ifølge krav 1 eller 2, **kendetegnet ved, at** åbningen (12) i bundvæggen (13) i reservoiret (2) er anbragt koaksialt med røret (9) på en sådan måde, at røret (9) passerer igennem åbningen (12) med tilstrækkelig afstand opretholdt der imellem.

4. Belysningsindretning ifølge krav 1 eller 2, **kendetegnet ved, at** den nævnte åbning (12) i bundvæggen (3) i reservoiret (2) er anbragt nær sidevæggen (3) i reservoiret (2).

5. Belysningsindretning ifølge krav 4, **kendetegnet ved, at** åbningen (12) i bundvæggen (3) i reservoiret (2) i forhold til det centralt anbragte rør (9) omfattende vægen (8), er anbragt på den modsatte side af udluftningsåbningen (6), med det tilhørende rør (5).

6. Belysningsindretning ifølge ethvert af kravene 1 til 5, **kendetegnet ved, at** røret (9), som er indrettet til at modtage vægen (8), består af metal.

7. Belysningsindretning ifølge ethvert af kravene 1 til 5, **kendetegnet ved, at** røret (9), som er indrettet til at modtage vægen (8), består af et ikke brændbart ikke-metallisk materiale.

8. Belysningsindretning ifølge krav 7, **kendetegnet ved, at** røret (9), som er indrettet til at modtage vægen (8), består af keramisk materiale.

9. Belysningsindretning ifølge ethvert af de foregående krav, **kendetegnet ved, at** topvæggen (15), sidevæggen (3) og bundvæggen (13) i reservoiret (2) består af syntetisk materiale.

DRAWINGS

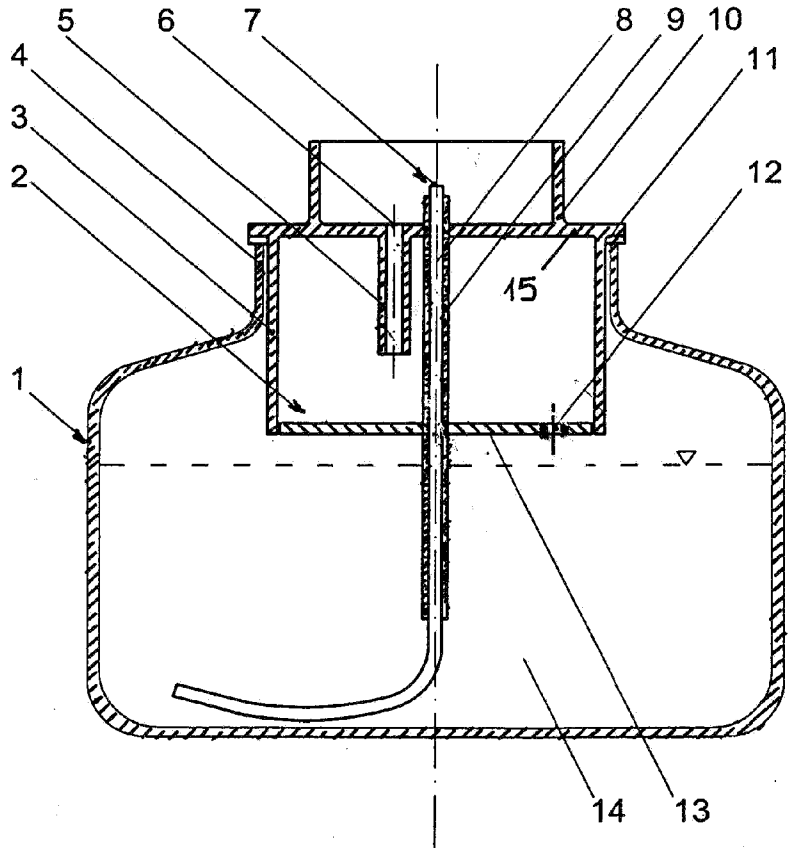


Fig. 1

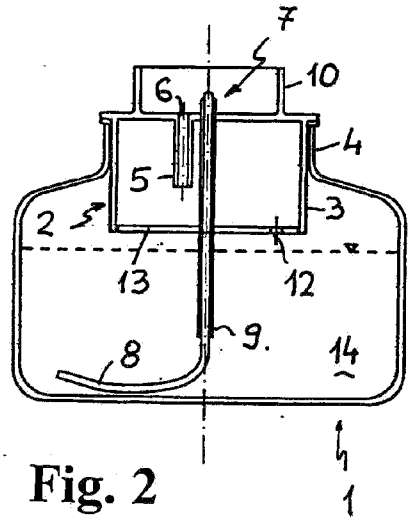


Fig. 2

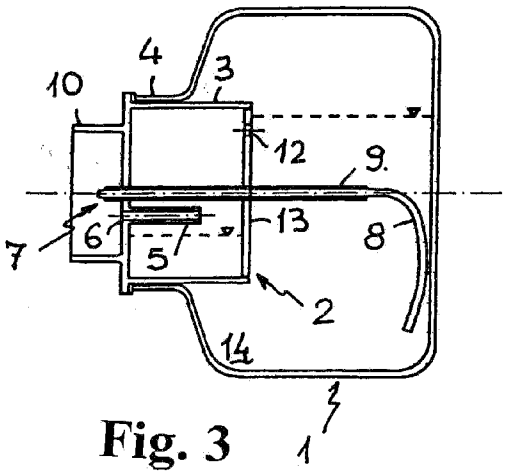


Fig. 3

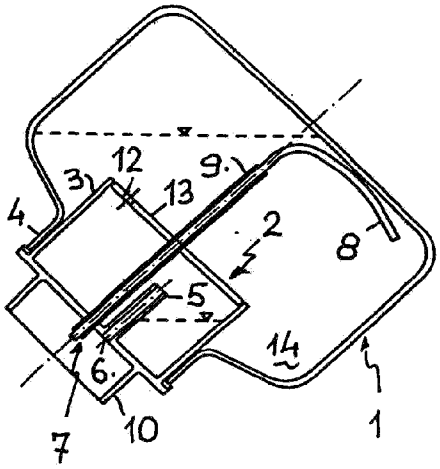


Fig. 4

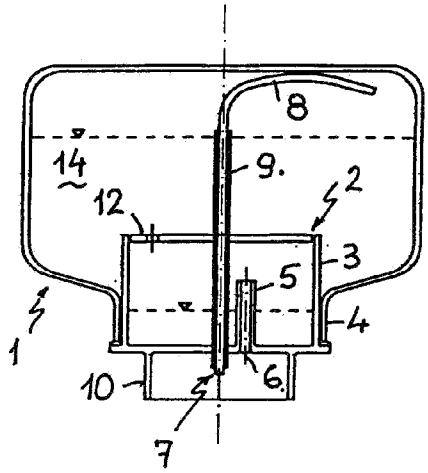


Fig. 5

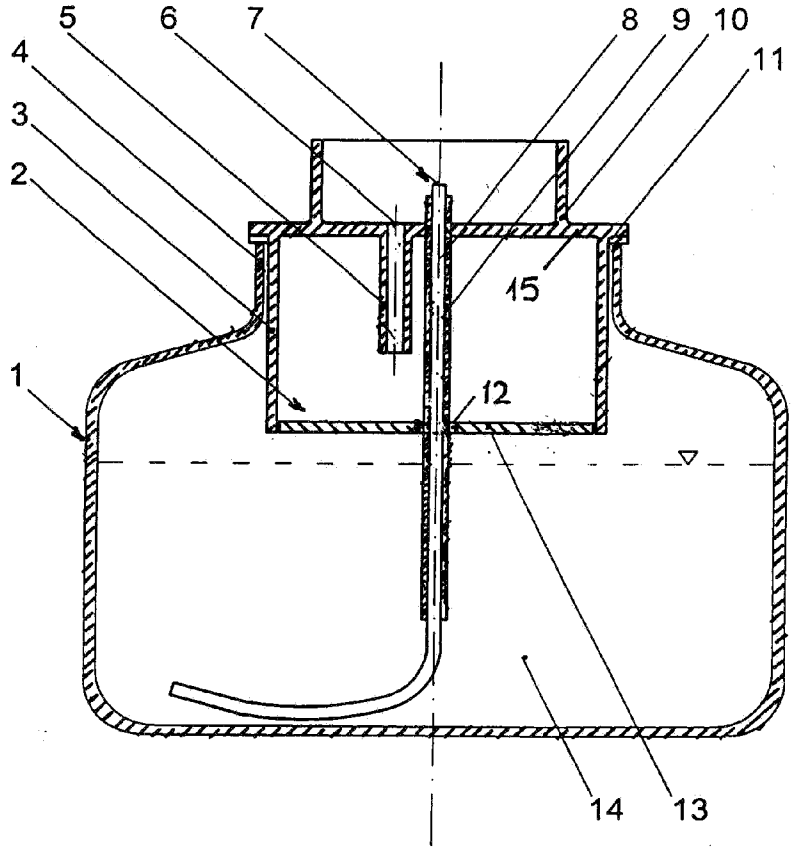


Fig. 6