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(54) Fire-proof drain

(57) The present invention relates to a fire-proof drain (1) comprising an expandable material (12) and a drain housing (2), which drain housing (2) is connected to a drain pipe and fixed to a base (20, 22, 24) where a mount-

able drain trap (4) is installed into the drain housing (2), where the drain trap (4) comprises a cup (6) mounted in connection with the drain trap (4), where the expandable material (12, 13) is arranged between the cup (6) and the drain trap (4).

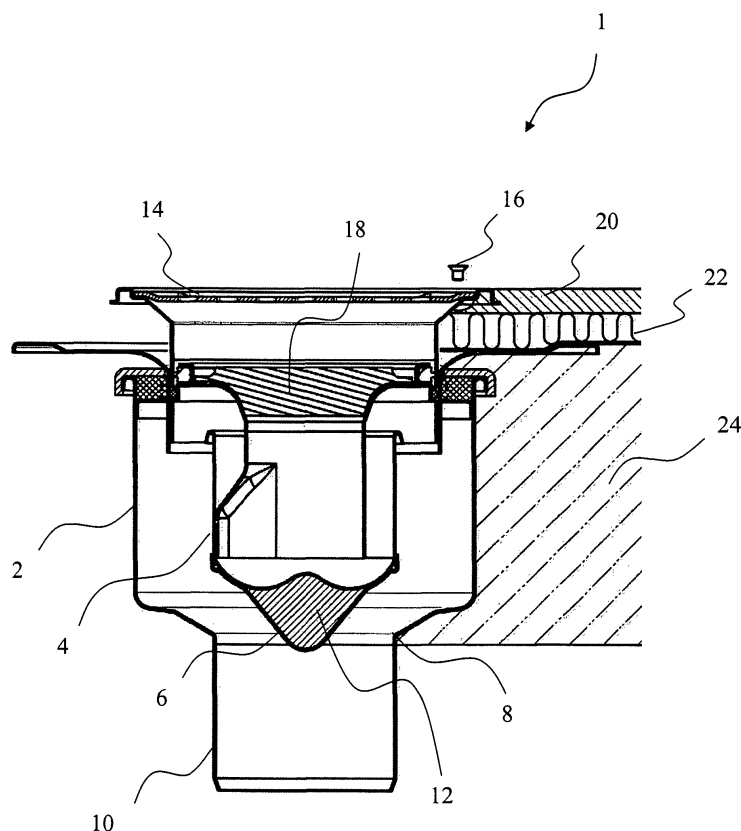


Fig. 1

Description

Field of the invention

[0001] The present invention relates to a fire-proof drain comprising an expandable fire-proof material and a drain housing, which drain housing is connected to a drain pipe and fixed to a base where a mountable drain trap is installed into the drain housing.

Background of the invention

[0002] In a multi-floor building the drains represent a fire risk and a risk of toxic gas and smoke spreading throughout the building via the floors. The drain can function as a chimney where smoke and fire can be drawn from one floor to another. In recent years there have been increased focus on fire-proof construction materials, and new rules and regulations have been set out by national governments.

[0003] Various solutions have been used as regards fire-proof sewers or drains with fire-proof materials, which expands due to high temperatures.

[0004] US 5183070 discloses a fire-stop device for flammable floor construction, which prevents the spreading of smoke and fire throughout a building by an opening such as a down-pipe or the like. A non-flammable insert unit is mounted inside an inclined extension pipe in such a way that the insert is released during fire and falls down into the main pipe, where it blocks the passage of the pipe.

[0005] The German patent application DE 10219086A1 discloses a fire-proof drain to a drain pipe comprising a metal body designed to fit into a drain pipe where an expandable and fire-proof material is installed between the metal body and the drain pipe. This way, the expandable material is placed as a collar around the drain pipe. In case of fire the drain pipe melts and the fire-proof material fills up the drain thus preventing fire and smoke from spreading throughout the building.

[0006] DE 10251907A1 discloses a fire-proof drain comprising a drain housing, a drain trap and a drain pipe section. In order to fill out the space under the drain trap in case of fire a fire-proof material is installed between the drain housing and the drain pipe section.

[0007] One of the downsides of the aforementioned inventions comprising an expandable material is that some materials have to melt or be removed before the fire-proof material is able to expand correctly and block the passage of the pipe. Furthermore, the direction in which the fire-proof material expands can not be controlled due to the risk of the drain pipe section not being fully filled with expandable material. If for instance, the fire-proof material collar is not properly installed.

[0008] The aforementioned inventions are complicated to install and reinstall, because they involve replacement of the entire drain, which is both costly and inconvenient.

Object of the invention

[0009] Thus the object of the invention is to provide a fire-proof drain, which provides quick and efficient fire protection. A further object of the invention is to provide a drain, which is easy to reinstall and maintain, especially in existing drain systems.

Description of the invention

[0010] This object can be achieved if the drain trap comprises a cup mounted in connection with the drain trap, where an expandable material is arranged between the cup and the drain trap.

[0011] In case of fire the heat causes the expandable material, which is located between the drain trap and the cup, to expand when a certain temperature is reached. At the same time the cup comes loose causing it to move towards the mouth of the drain pipe, the outlet of the drain housing thus blocking the passage of the drain. The expandable material is continuously expanding providing a fire-proof sealing of the passage thus preventing fire and smoke from spreading via the drain. Furthermore, the expanded material creates an insulation layer, which reduces the transmission of heat through the drain and the surface temperature of the drain is hereby lowered considerably. The surface temperature in existing drains without fire protection can exceed several hundred degrees in case of fire, which may cause furniture and other combustible materials near the drain to catch fire.

[0012] Generally two types of demountable drain traps exist. In one version the waste water runs down at the centre of the drain trap, while in another version the water runs down at the circumference of the drain trap. According to a preferred embodiment of the invention, the cup is installed onto the drain trap, where the water runs down at the centre. This way it is possible to install the cup filled with expandable material underneath the centre of the drain trap just above the drain pipe for quick and efficient sealing of the drain. According to another embodiment of the invention the cup is installed inside the drain trap just above the drainpipe. This is relevant when the drain trap is installed with the bottom up. However, it is important to note that the invention is not limited to the design of the drain trap and the invention can be used in combination with many different designs and types.

[0013] This way, very efficient fire protection of the drain is achieved preventing smoke and fire from passing through the drain thus preventing the spread of fire and smoke through the drain. The present invention provides fast fire-protection which minimizes the amount of smoke passing through the drain in case of fire. It is important to note that the invention is not limited to a drain pipe of a specific material e.g. plastic, metal or the like. The invention will often be used in combination with a drain pipe of plastic.

[0014] Another advantage of the present invention is that the drain trap comprising the fire-proof expandable

material is easy to reinstall and maintain. Thus, improvement of existing drains is possible at affordable costs, hence, the existing or future rules and regulations concerning fire-proof drains can be met without extensive construction work. The drain is also suitable for installation into new buildings.

[0015] Furthermore, as the drain trap is demountable, it is easy to maintain and clean the drain, thus preventing sediments and waste to accumulate in the drain. This way, it is easy to perform periodical visual inspection of the drain trap to ensure that the fire protection is properly installed and undamaged.

[0016] According to an advantageous embodiment of the invention, the cup is fixed to the drain trap by adhesive fastening means. When the temperature rises due to fire, the adhesive fastening means loosen up due to the pressure from the expanding material which helps displace the cup towards the mouth of the drain pipe or the drain pipe section in such a way that an effective sealing of the drain is achieved.

[0017] When the adhesive fastening means are used together with a packing such as an O-ring or the like, an efficient sealing of the cup is achieved. This prevents sediments and waste water from entering the cup and getting in contact with the expandable material. Waste water might contain aggressive solutions, such as cleaning agents etc., which might destroy the material.

[0018] According to an advantageous embodiment of the invention the cup is shaped as a cone, which cup being filled with an expandable material. When the cup is shaped as a cone, correct placement of the cup into the drain pipe is easy to obtain. The cone-shape ensures correct installation of the cup, even though the expansion of the material inside the cup is not uniform in all directions. As the fire protection comprises of a combination of the cup and the expandable material, the fire protection works even though the cup is not properly installed into the mouth of the drain pipe or the like.

[0019] According to a preferred embodiment of the invention, the cup diameter is larger than the diameter of the drain pipe which prevents the entire cup from falling into the drain pipe. Most drain pipes have a circular circumference, and in order to prevent the cup from falling into or through the drain pipe, the diameter of the cup should be larger than the diameter of the drain pipe.

[0020] When the expandable material is exposed to temperatures above a certain temperature, it expands many times its normal volume. Furthermore the material is fire-proof and formable such that it can fill up the space underneath the drain trap and adapt to the shape of the drain housing.

Short description of the Drawings

[0021] In the following the invention is explained in more detail with reference to the drawing, where

FIG. 1 shows the drain under normal conditions,

FIG. 2 shows the drain in case of fire,

FIG. 3 shows a cross-section of a drain trap,

FIG. 4 shows a cross-section of a cone-shaped cup and

5 FIG. 5 shows a perspective view of a drain trap

Detailed description of the invention

[0022] Fig. 1 shows the drain 1 under normal conditions comprising a drain housing 2 into which a drain trap 4 is mounted. A cone-shaped cup 6 is attached underneath the drain trap 4 in such a way that the cup 6 points towards the mouth 8 of the outlet 10 of the drain housing 2. The space between the drain trap 4 and the cup 6 is filled with an expandable material 12 shown in the figure as the hatched area. The expandable material 12 is fire-proof. The top of the drain 1 is closed with a grid 14 which is mounted onto the drain housing 2 by a number of screws 16 (only one is shown).

[0023] The drain trap 4 is easily demounted by firstly unscrewing the screws 16 (only one is shown) and secondly pulling out the drain trap by the handle 18. This way it is easy and quick to clean and maintain the drain housing 2 and the drain trap 4. It is also possible by visual inspection to ensure that the cup comprising the expandable material is correctly attached to the drain trap 4. Because the fire protection is attached to the demountable drain trap 4, it is easy to install into existing drain housings 2 in order to meet the existing and future rules and regulations regarding fire proof construction materials.

[0024] Fig. 1 shows the drain housing 2 being installed into the floor comprising of a floor surface 20, an insulation layer 22 and a deck 24. An insulation layer is not always present.

[0025] Fig.2 shows the drain in case of fire. The cup 6 has been displaced into the mouth 8 of the outlet 10 of the drain housing 2 and the expandable material 13 has filled out the lower part of the drain housing. This way the drain is provided with an efficient seal in order to prevent smoke and fire from spreading through the drains from one floor to another. At the same time the chimney effect is avoided because the pathway for heat is blocked.

[0026] Fig. 3 shows a cross-section of an embodiment of the drain trap 4 comprising a cone-shaped cup 6 mounted underneath the drain trap 4. The drain trap 4 has a packing 26 attached at the top circumference of the upper part 28 of the drain trap 4 for obtaining an airtight connection with the drain housing (not shown) which prevents leaking of repellent smell from the sewer. The cup 6 is filled with an expandable material (not shown) that expands when exposed to high temperatures in case of fire. According to an advantageous embodiment of the invention, the cup 6 is fastened to the drain trap 4 by adhesive fastening means (not shown). A transverse handle 18 is mounted on the drain trap 4 making it easy and quick to reinstall into the drain housing (not shown). According to a preferred embodiment of the invention the

drain trap 4 and the drain housing (not shown) is made of metal. However, other materials such as plastic can be used as long as the materials prevent the expandable material from falling through the drain. The upper part 28 of the drain trap 4 is attached to the lower part 30 by two connecting parts 32, 34. 5

[0027] The drain trap shown is just one of many types, and the present invention can be used in combination with many different constructions.

[0028] Fig. 4 shows a cross-section of the cone-shaped cup 6 which is also shown as part of the drain trap 4 in fig. 3. The outer edge 7 is bent to obtain connection with the cylindrical lower part of the drain trap. The cup is preferably fastened to the drain trap by adhesive fastening means, however, other types of fastening means like suspension or other mechanical fastening means could be used. 10 15

[0029] Fig. 5 shows a perspective view of the drain trap 4 comprising a handle 18 which makes the drain trap easy to mount and demount into the drain housing (not shown). 20

[0030] The packing 26 is mounted at the outer circumference of the drain trap for proper sealing. The cup (not shown) is attached to the lower side 36 of the drain trap 4. 25

Claims

1. Fire-proof drain (1) comprising an expandable material (12,13) and a drain housing (2), which drain housing (2) is connected to a drain pipe and fixed to a base (20, 22, 24) where a mountable drain trap (4) is installed into the drain housing (2), **characterized in that** the drain trap (4) comprises a cup (6) mounted in connection with the drain trap (4), where the expandable material (12, 13) is arranged between the cup (6) and the drain trap (4). 30 35
2. Fire-proof drain (1) according to claim 1 **characterized in that** the cup (6) is fixed to the drain trap (4) by adhesive means. 40
3. Fire-proof drain (1) according to at least one of the claims 1-2 **characterized in that** a packing (26) is attached between the cup (6) and the drain trap (4). 45
4. Fire-proof drain (1) according to at least one of the claims 1-3 **characterized in that** the cup (6) is shaped as a cone, which cup (6) is filled with an expandable material (12, 13). 50
5. Fire-proof drain (1) according to one of claims 1-4 **characterized in that** the cup (6) has a larger diameter than the diameter of the drain pipe, which prevents the entire cup (6) from falling into the drain pipe. 55

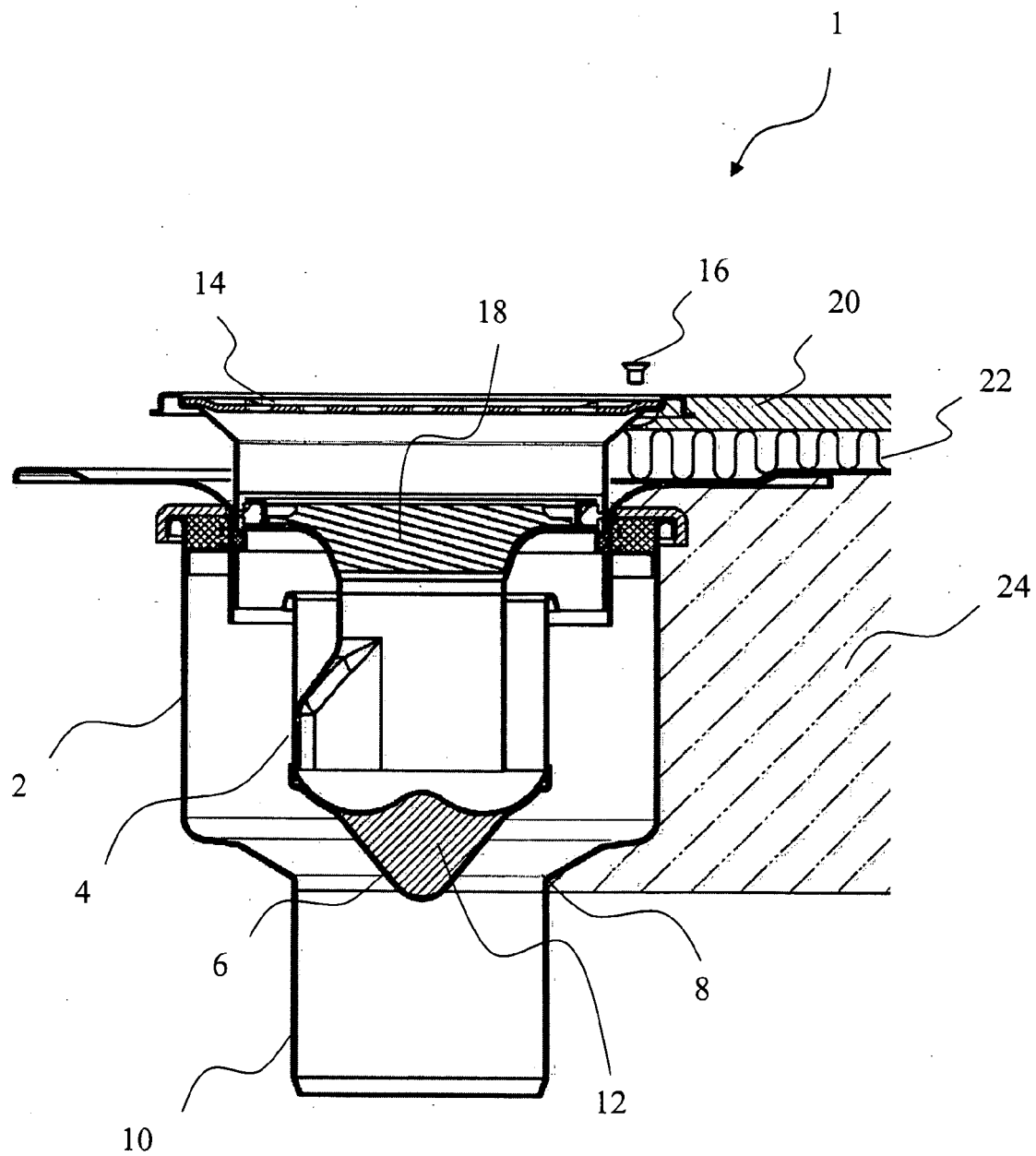


Fig. 1

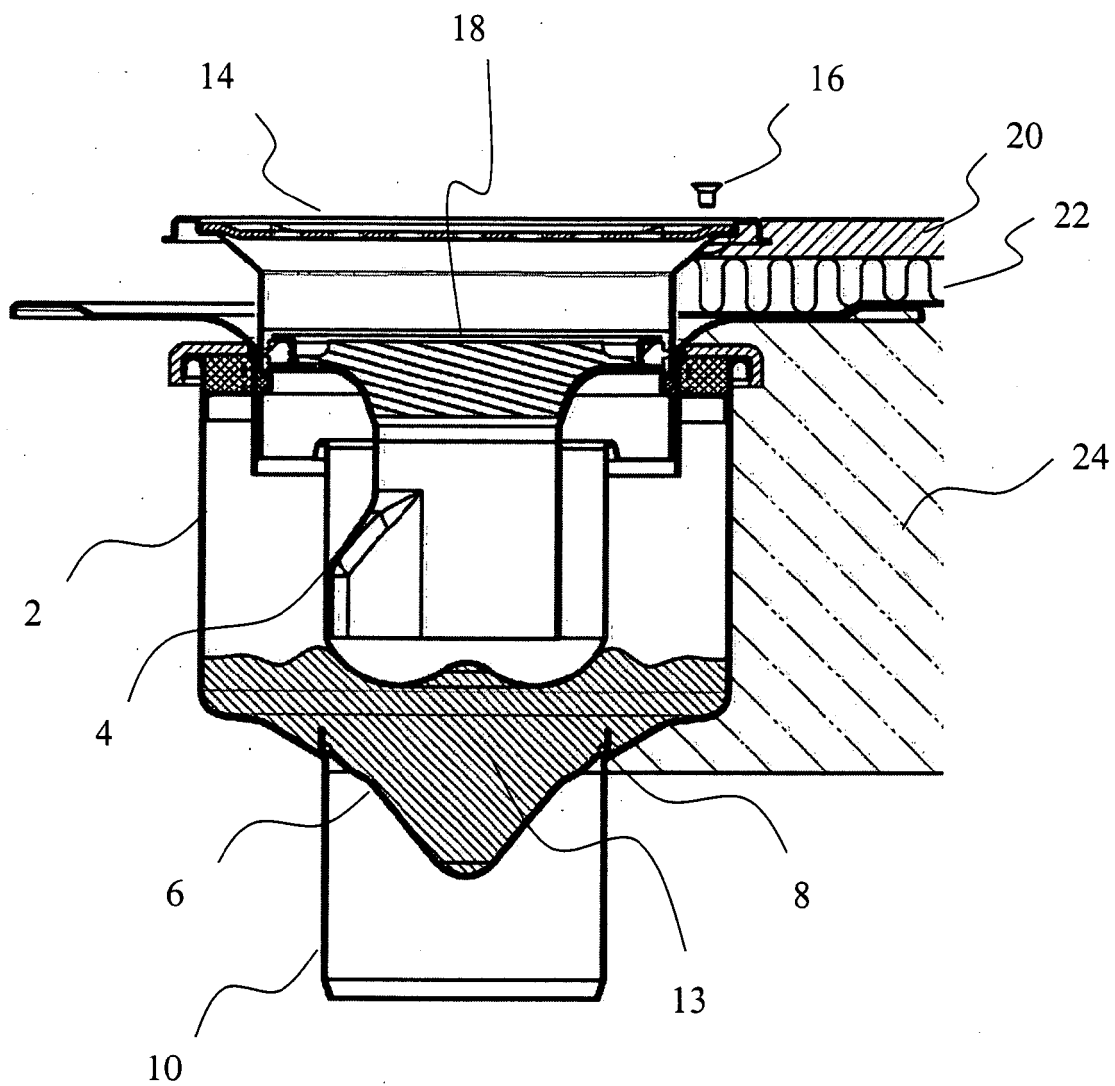


Fig. 2

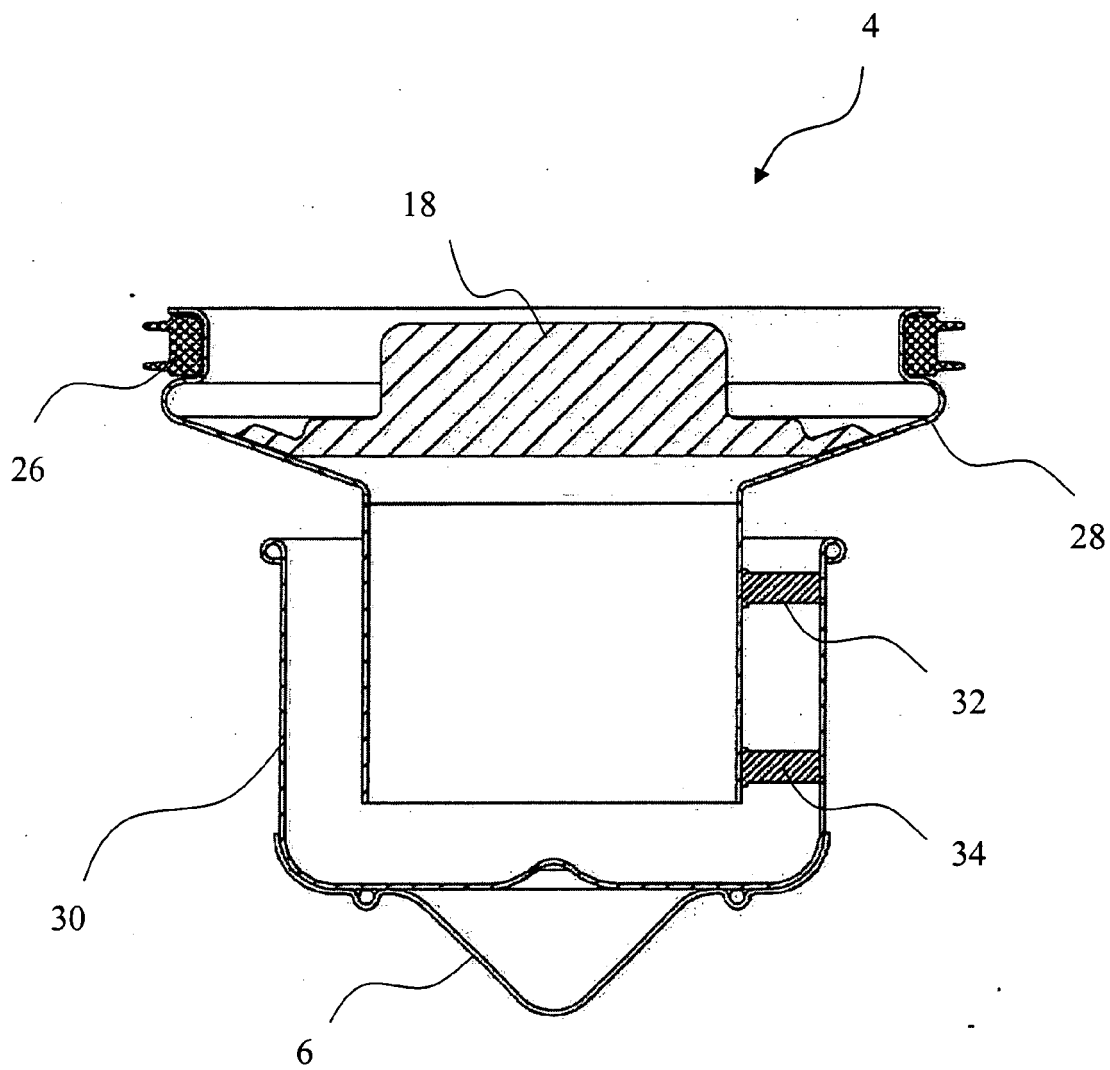


Fig. 3

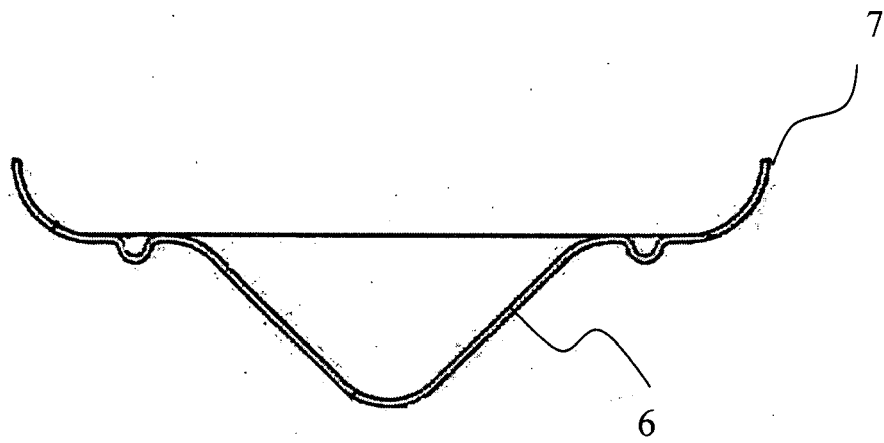


Fig. 4

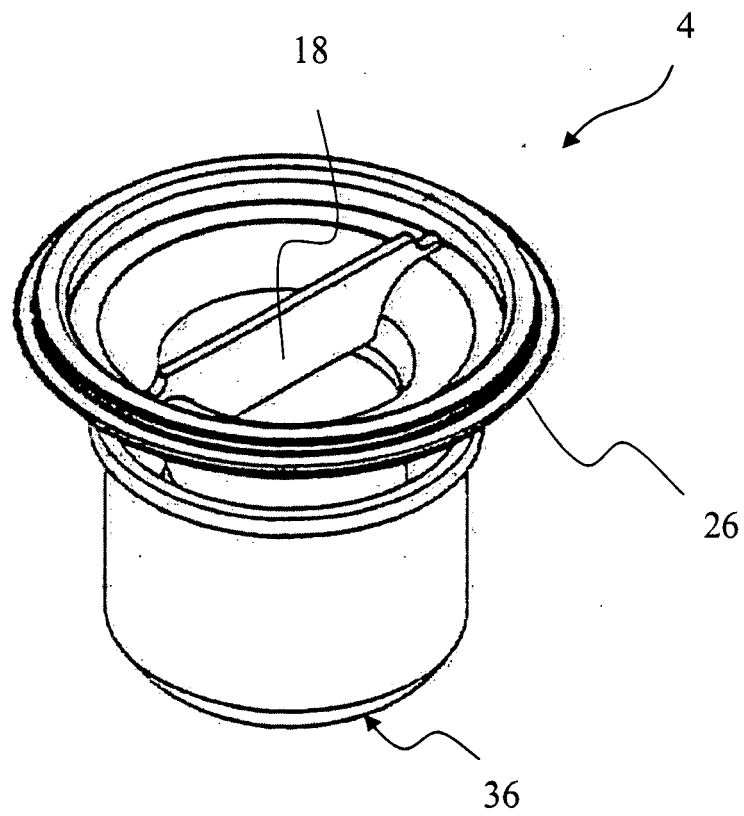


Fig. 5



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 04 02 2869

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	DE 10 2004 007454 A1 (DALLMER GMBH & CO. KG) 26 August 2004 (2004-08-26) * paragraphs [0011] - [0015] * * paragraph [0019] * * figures 1,2 * -----	1-5	E03F5/04
			TECHNICAL FIELDS SEARCHED (Int.Cl.7) E03F
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 22 February 2005	Examiner Urbahn, S
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 102004007454 A1	26-08-2004	NONE	

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