(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 123 984 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
25.11.2009 Bulletin 2009/48

(51) Int Cl.:
F24D 19/10 *(2006.01)*

(21) Application number: **09159161.0**

(22) Date of filing: **30.04.2009**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK TR

(30) Priority: **02.05.2008 GB 0808052**

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(54) Improvements in and relating to header tanks

(57) A safety device is provided for a header tank 3, the safety device having means for connecting the safety device to the header tank 3, the safety device being heat sensitive such that if water in the header tank 3 rises undesirably, the safety device acts to empty at least some of the water from the header tank 3 in a controlled and safe manner. In one embodiment, the safety device comprises a heat sensitive valve 2 and a drainage pipe 5.

Usually a header tank will have means such as a ball-cock to supply fresh cold water to the header tank, when the level of water in the tank falls below a predetermined level. Thus actuation of the safety device according to the invention will result in fresh cold water replacing heated water in the header tank resulting in a safe condition.

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Description

[0001] The invention relates to header tanks. Header tanks are typically open cisterns made from a plastics material and are used to supply cold water, for example to a central heating system. Header tanks are typically located above hot water tanks in, for example, the attic of a house. In use, a header tank supplies replacement cold water to a hot water tank through a supply pipe. The replacement cold water is supplied when hot water is drawn from the hot water tank as a result of for example, someone having a shower.

[0002] Throughout the day, a hot water tank is operated to heat and maintain the temperature of the water to be at a desired level. Typically, heating the water and maintaining the temperature of the water is controlled by a thermostat and for safety purposes a vent pipe is also used to allow excess pressure, air bubbles and steam that may build up in the hot water tank, to be removed through the header tank.

[0003] However, if the thermostat is faulty or fails, the water in the hot water tank can be heated undesirably. This can lead to the hot water tank causing the water in the supply tank and the header tank also to be heated, which can result in the temperature of the normally cold water in the header tank increasing undesirably. As the header tank is typically made from a plastics material not designed to hold hot water, the header tank may melt, leading to hot, potentially scolding hot water, leaking out through the floor of the attic into any room below. This is clearly highly undesirable and should a person be situated beneath the header tank when it leaks, injury and possibly death may occur.

[0004] It is an aim of the invention to address problems associated with header tanks that are identified herein or otherwise.

[0005] The invention provides a safety device for a header tank, the safety device having means for connecting the safety device to a header tank, the safety device being heat sensitive such that if water in the header tank rises undesirably, the safety device acts to empty at least some of the water from the header tank in a controlled and safe manner.

[0006] Usually the header tank will have means such as a ball-cock, to supply fresh cold water to the header tank, when the level of water in the tank falls below a predetermined level. Thus actuation of the safety device according to the invention will result in fresh cold water replacing heated water in the header tank, resulting in a safe condition.

[0007] The safety device may comprise a valve which at one temperature is closed, and at a higher temperature is open.

[0008] The valve may incorporate a control member which melts above a threshold temperature.

[0009] The threshold temperature may be between 60 to 66°C.

[0010] The control member may comprise a heat sensitive membrane.

[0011] The membrane may be made of wax.

[0012] The valve member may have first and second body parts, the membrane being sandwiched between the body parts.

[0013] One of the body parts may have a recess dimensioned to receive the membrane.

[0014] The membrane may comprise a disc, the recess being shaped and dimensioned such that the disc is a tight fit within the recess to reduce the risk of leakage.

[0015] Each body part may have at least one aperture through which water can flow, in use, once the membrane has melted.

[0016] One of the body parts may have more apertures than the other body part.

[0017] A sealing element may be provided between the body parts arranged to prevent water from leaking out between the body parts.

[0018] The safety device may have means for clamping the body parts together.

[0019] The means for clamping the body parts together may comprise part of a threaded plumbing fitting arrangeable to mount the safety device in an aperture in a header tank, below the maximum water level of the header tank.

[0020] The invention includes a header tank having a safety device according to the invention.

[0021] The header tank may have a ball-cock system such that additional cold water will be supplied to the header tank if the safety device operates to empty at least some of the water from the header tank.

[0022] The safety device may be mounted in the side wall of the header tank, for example at a position 30 to 70mm below the maximum water level in the header tank.

[0023] Preferably the safety device includes a water conduit which directs heated water to a safe point, should the safety device operate.

[0024] The conduit may be connected to a conventional overflow pipe of the header tank.

[0025] The present invention may be carried out in practice in various ways but a specific embodiment will now be described, by way of example and with reference to the accompanying drawings, in which:

Figure 1 shows a side view of a header tank assembly of an embodiment of the present invention;

Figure 2 shows a perspective view of the header tank assembly;

Figure 3 shows an exploded side view of a heat sensitive element for the header tank assembly;

Figure 4 shows a front view a heat sensitive membrane for the heat sensitive element;

Figure 5 shows a side view of the heat sensitive membrane;

Figure 6 shows a front view of a first body part for the heat sensitive element; and

Figure 7 shows a front view of a second body part for the heat sensitive element.

[0026] Figure 1 shows a header tank assembly 1 of an embodiment of the present invention. The header tank assembly 1 has a heat sensitive valve 2, a header tank 3, a water supply apparatus 4 and a drainage pipe 5. The heat sensitive valve 2 is arranged to empty some of the water into the drainage pipe 5 in response to the water held in the header tank 3 reaching a threshold temperature. The drainage pipe 5 is connected to an overflow pipe O of a central heating system to dispose of the water emptied from the header tank 3, in use.

[0027] As a result of the emptying of water, the level of water in the header tank 3 is reduced, which in turn triggers the apparatus 4 to supply water into the header tank 3 from, for example, a mains water supply. The supplied water is of a temperature lower than the threshold temperature thereby causing the temperature of the water held in the header tank 3 to be maintained or reduced to a temperature lower than the temperature at which the header tank would melt.

[0028] To ensure that the water can be drained from the header tank 3, the heat sensitive valve 2 is positioned on a side wall of the header tank 3 beneath a "full" water level (shown for exemplary purposes as a line WL). The "full" water level WL of the header tank 3 is in the region of between 50mm to 150mm from a top edge of the header tank 3. The heat sensitive valve 2 is positioned in the region of between 25mm to 100mm beneath the full water level WL.

[0029] Figure 2 shows that the heat sensitive valve 2 is positioned to extend from an external surface of the header tank 3 through the side wall to an internal surface of the header tank 3. The internal surface forms a water holding area of the header tank 3 in which a reservoir of water is held. A first end 20 of the heat sensitive valve 2 is situated in a region external to the header tank 3. A second end 21 is situated in a region internal to the header tank 3. The first end 20 is connected to the drainage pipe 5 to allow water to be drained from the header tank 3 through the second end 21, in use. The second end 21 has a heat sensitive element that opens the heat sensitive valve 2 when the temperature of the water is above a threshold temperature, for example, 60°C.

[0030] The heat sensitive valve 2 has a tubing to direct the water drained from the header tank 3 to the drainage pipe 5. The tubing comprises a plumbing fitting comprising a plurality of securement means 22, 23, 24 having screw threads and nuts to allow the valve to be secured. The first securement means 22 is for connecting the valve to the drainage pipe 5. The second securement means 23 is for holding the valve in position on the side wall of the header tank. The third securement means 24 is for holding a valve end cap 25 in position on the heat sensitive valve 2. The securement means 22, 23, 24 also have sealing means to reduce the amount of water that can leak from the header tank 3 through the heat sensitive valve 2.

[0031] The tubing is substantially L-shaped, i.e., the tubing has an approximately 90° bend. The tubing is bent to allow the drainage pipe 5 to be connected to an overflow pipe O of a central heating system. With the drainage pipe 5 connected in this way, the heat sensitive valve 2 uses the typical facilities of the central heating system to dispose of water emptied from the header tank 3.

[0032] The valve 2 components can be constructed from any suitable material, such as, plastics materials, steel, stainless steel, brass and copper.

[0033] Figure 3 shows the heat sensitive element as having body parts in the form of an end cap 25 and a plug 26. A meltable membrane 27 is sandwiched between the body parts. These components 25, 26, 27 are used to control the flow of hot water from the header tank 3. To form the heat sensitive element the meltable membrane 27 is positioned in a recess 28 of the plug 26 and the end cap 25 is positioned to form a sandwich of the membrane 27 with the plug 26.

[0034] The membrane 27 is disc shaped as shown by Figures 4 and 5. The membrane is dimensioned to tightly fit into the recess 28. The membrane 27 is manufactured from a material, for example wax, that melts when a predetermined threshold temperature is reached. The threshold temperature is set to be beneath the temperature at which the header tank melts. For example, if the plastics material used for the header tank melts at a temperature between of 70°C to 90°C, then the membrane is made from a material that melts at around 60-66°C.

[0035] Figures 6 and 7 show a front view of the end cap 25 and plug 26 used to hold the membrane 27 in position on the header tank 3. The end cap 25 and plug 26 have apertures through which the water drains from the header tank 3. The end cap 25 has a plurality of apertures and the plug has one aperture. Both the end cap 25 and plug 26 have a sealing element so that a seal is formed between them when positioned in the heat sensitive valve 2.

[0036] To fit the valve 2 to the header tank 3, firstly, the header tank is drained and prevented from filling with water. An aperture is then created in the side wall of the header tank beneath the "full" water level by drilling a hole into a side wall of the tank. The second end 21 is then positioned through the header tank aperture. A nut is then positioned on a screw thread of the second securement means 23 and then tightened to fix the valve 2 to the header tank 3. The plug 26, membrane 27 and end cap 25 sandwich is then inserted into the second end 21 and secured to the valve 2 using the third securement means 24. Additional sealant is then optionally added. The header tank 3 is then allowed to refill to immerse the heat sensitive valve 2 in water.

[0037] To allow the hot water to be drained out the tank 3, the first securement means 22 is then used to connect

the valve 2 to the drainage pipe 5. The drainage pipe 5 is then connected to an overflow pipe O.

[0038] As described below, with the valve 2 immersed in the water held in the header tank, the risk of that water exceeding a temperature above which the header tank will melt is reduced.

[0039] During a normal daily cycle the header tank 3 supplies water to a hot water tank as and when it is required. Whilst water is being supplied to the hot water tank, the amount of water in the header tank is reduced. Referring to figure 1, the water supply apparatus 4 recognises this reduction through use of a ball cock system 40. The ball cock system 40 comprises an arm 41 that is pivotally connected at one end to a water supply valve 42 and at the opposed end to a float 43. The float 43 rests on top of the surface of the water in the header tank. The float 43 is buoyant and moves upwards and downwards in the header tank 3 in response to a change in level of the water in the header tank 3. In a first position, when the water is at the "full" water level, the float 43 moves the arm 41 to close the valve 42. In a second position, when the water is lower than the "full" water level, the float moves the arm 41 to open the water supply valve 42 and supply water into the header tank 3.

[0040] The heat sensitive valve 2 takes advantage of the water supply apparatus 4 to control the temperature of the water held in the header tank 3. During a temperature control cycle, if the water in the header tank reaches the threshold temperature, the membrane 27 melts. The melting of the membrane 27 opens the heat sensitive valve 2 and allows water to be drawn from the tank 3, which is directed to the overflow pipe O using the drainage pipe 5. As a result the water level in the tank 3 lowers, and triggers the water supply apparatus 4 as described for the normal daily cycle. As water continues to drain through the heat sensitive valve 2 the water supply apparatus 4 continuously supplies water causing the temperature in the header tank to be kept at the threshold temperature or be lowered. This maintaining or lowering of the temperature reduces the risk of the reservoir of water from rising above the threshold temperature due to a faulty thermostat.

[0041] The valve 2 reduces the problems associated with faulty thermostats causing a header tank to melt. The valve 2 is of a simple construction and takes advantage of typical central heating components so that it can be easily fitted to already installed header tanks or on new header tanks awaiting installation.

[0042] Attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

[0043] All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

[0044] Each feature disclosed in this specification (including any accompanying claims, abstract and drawings) may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

[0045] The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

Claims

1. A safety device for a header tank, the safety device having means for connecting the safety device to the header tank, the safety device being heat sensitive such that if water in the header tank rises undesirably, the safety device acts to empty at least some of the water from the header tank in a controlled and safe manner.

2. A safety device as claimed in Claim 1, comprising a valve which at one temperature is closed, and at a higher temperature is open.

3. A safety device as claimed in Claim 2, in which the valve incorporates a control member which melts above a threshold temperature.

4. A safety device as claimed in Claim 3, in which the threshold temperature is between 60 and 66°.

5. A safety device as claimed in Claim 3 or Claim 4, in which the control member comprises a heat sensitive membrane.

6. A safety device as claimed in Claim 5, in which the membrane is made of wax.

7. A safety device as claimed in Claim 5 or Claim 6, the valve member having first and second body parts, the membrane being sandwiched between the body parts.

8. A safety device as claimed in Claim 7, in which one of the body parts has a recess dimensioned to receive the membrane.

9. A safety device as claimed in Claim 8, in which the membrane comprises a disc, the recess being shaped and dimensioned such that the disc is a tight

fit within the recess to reduce the risk of leakage.

10. A safety device as claimed in any one of Claims 7 to 9, in which each body part has at least one aperture through which water can flow, in use, once the membrane has melted.

11. A safety device as claimed in Claim 10, in which one of the body parts has more apertures than the other body part.

12. A safety device as claimed in any one of Claims 7 to 11, in which a sealing element is provided between the body parts arranged to prevent water from leaking out between the body parts.

13. A safety device as claimed in any one of Claims 7 to 12, having means for clamping the body parts together.

14. A safety device as claimed in Claim 13, in which the means for clamping the body parts together comprises part of a threaded plumbing fitting arrangeable to mount the safety device in an aperture in a header tank, below the maximum water level of the header tank.

15. A header tank fitted with a safety device as claimed in any one of the preceding claims.

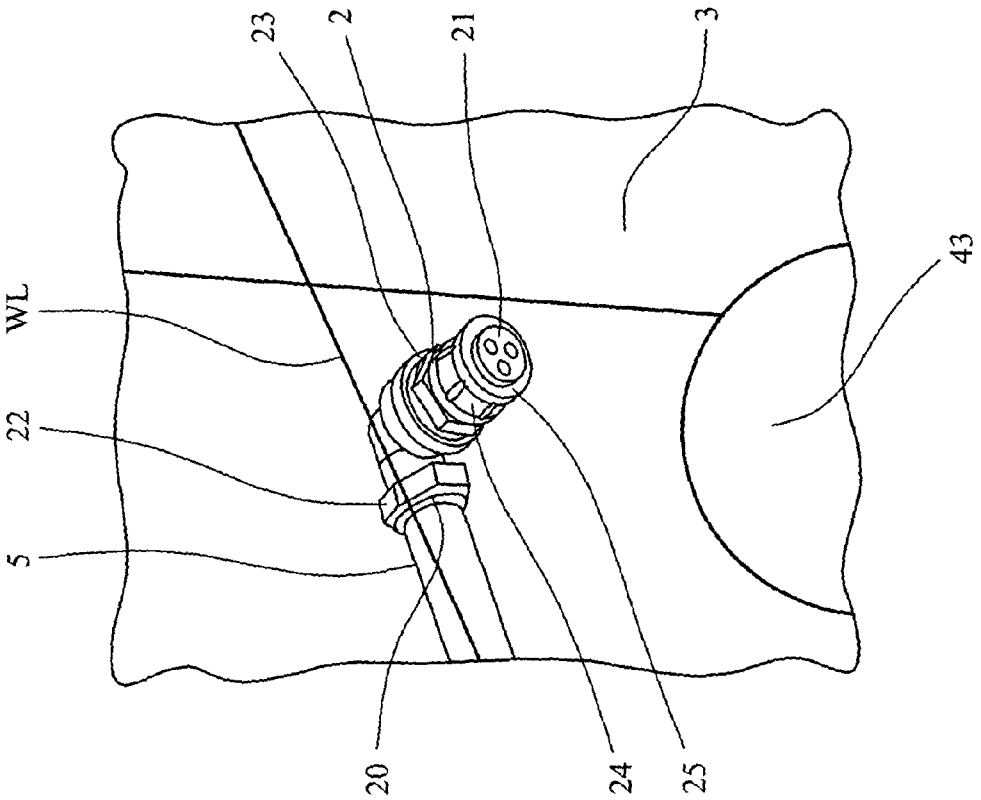

FIG. 2

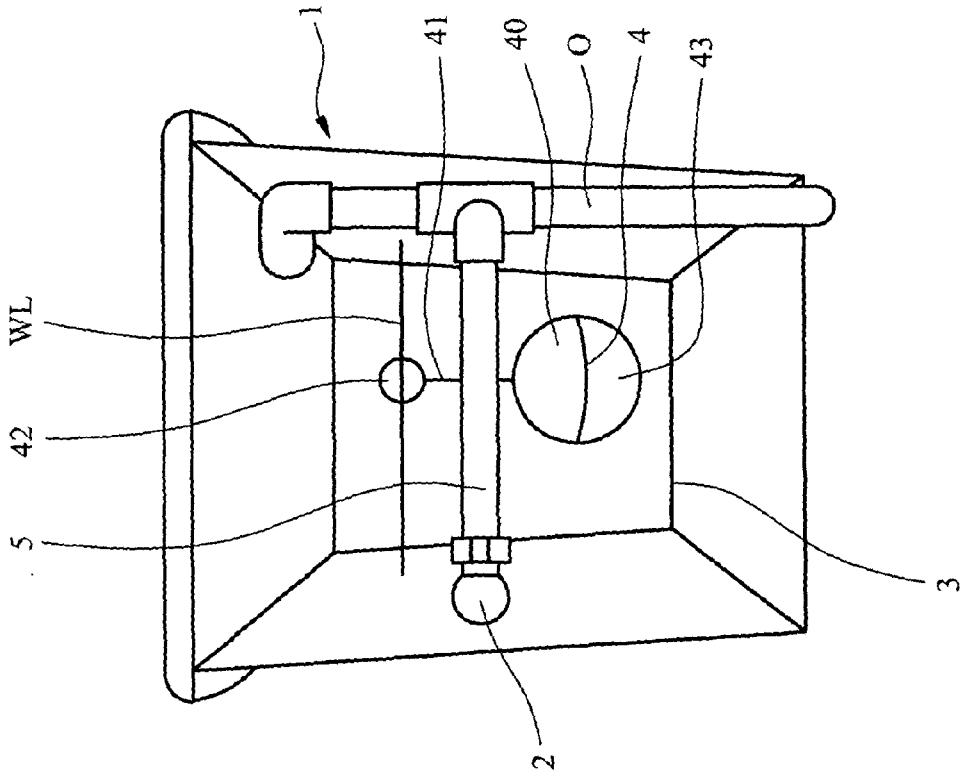

FIG. 1

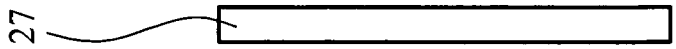

FIG. 5

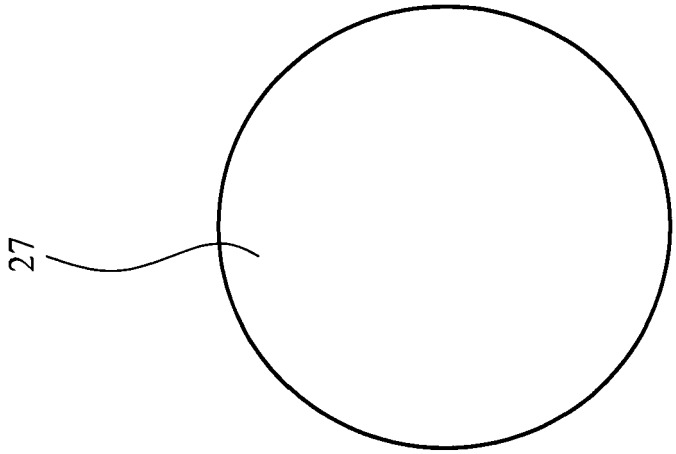

FIG. 4

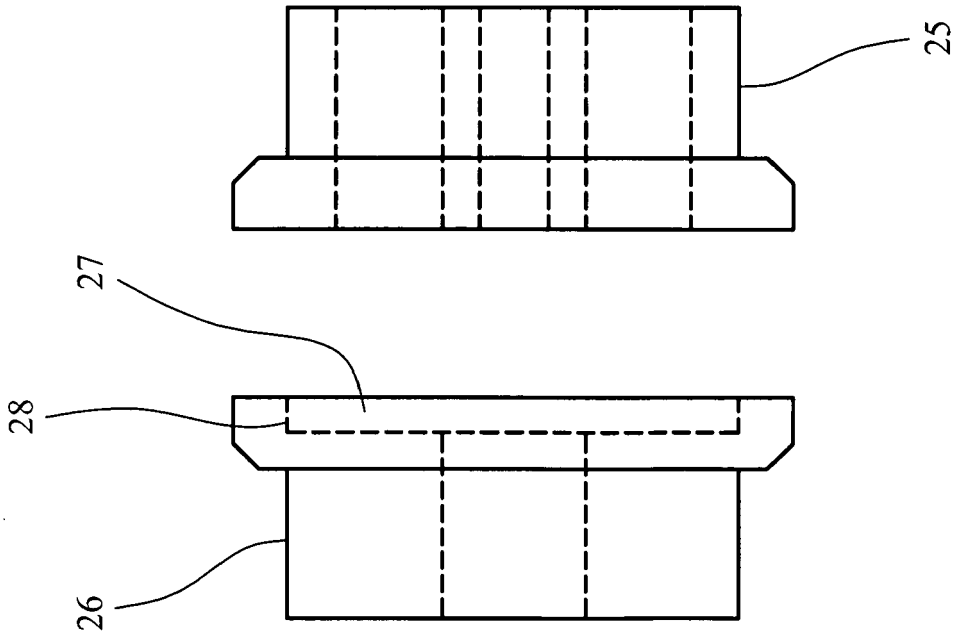

FIG. 3

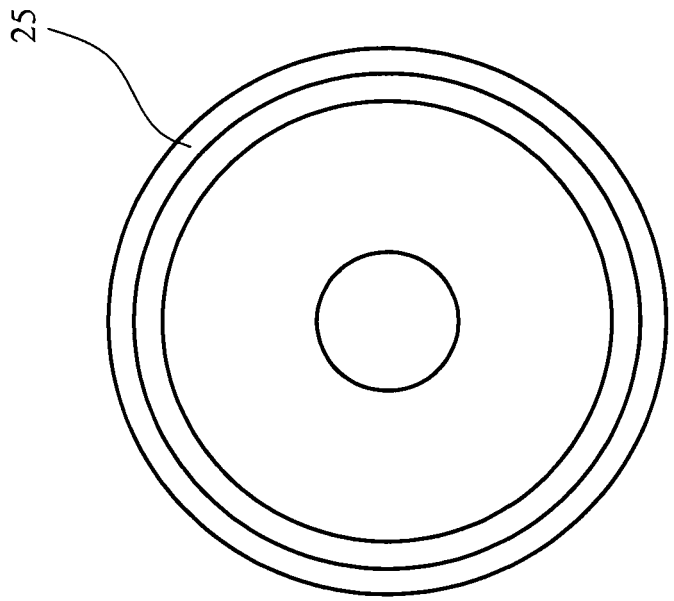

FIG. 7

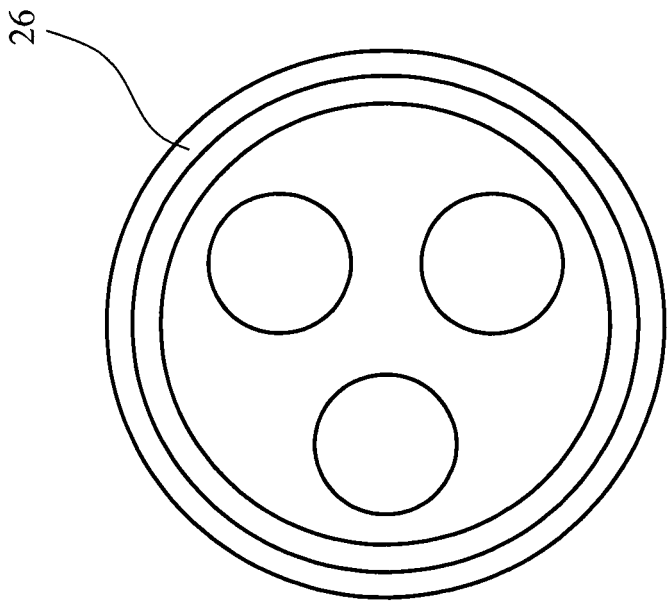

FIG. 6