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(54) **RADIATOR DOSING AND TESTING**

DOSIERUNG UND PRÜFUNG FÜR EINEN RADIATOR

DOSAGE ET ESSAI DE RADIATEUR

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Description

Field of the Invention

[0001] The present invention relates to apparatus for, and a method of, introducing a product into system water of a radiator and removing system water from a radiator for testing.

Background to the Invention

[0002] Central heating systems using water-circulation and comprising radiators that require maintenance on a regular basis to maintain efficiency are known. Systems will normally fall into two groups, open systems using cold water feed and expansion tanks, which are normally found within the loft space of a dwelling and are open to the atmosphere; or a closed system, which is sealed to the atmosphere and pressurised by the mains cold water supply before isolation, with the expansion and contraction of the system controlled by the use of an expansion vessel.

[0003] Any system constructed of metals and containing water will, to some degree, suffer from the effects of corrosion, hardness scale formation and microbial growth in the water, depending on the quality of the water used in that system and the temperature to which the water is subjected. The effects of corrosion are seen through system failure and the build up of corrosion debris, whereas the effects of water hardness scale formation will cause a reduction in system performance, a build up of sludge within the system will again cause a reduction in system performance or even total system failure. When water is used or retained in an open or closed system it is also subjected to contamination by micro organisms. Microbiological organisms ranging from simple bacteria to fungal and yeast spores can cause problems when they enter a system. The effects of microbiological organisms are they attack the base materials of the system as well as using the corrosion and scale debris as a nutrient source, this results in the water becoming more acidic, the system becomes more open to corrosion and as a by-product forms gas within the system (known as 'air'). The air within the system radiators substantially reduces the efficiency of the system as a whole. Therefore a build up of corrosion debris, water hardness scale formation and a build up of sludge will all add to making the general energy efficiency of the whole system decrease substantially.

[0004] To minimise the effects of corrosion, hardness scale formation and microbiological organisms, chemicals usually termed 'inhibitors', are required to be added to these systems at regular intervals and at an appropriate concentration specific to that chemical. The introduction of the appropriate level of inhibitor and maintenance of that level are paramount, in maintaining that systems are as free as possible from corrosion, hardness scale formation and microbiological organisms. The objectives of water treatment may be summarised as follows:

a) to minimise corrosion of the system metals;
b) to inhibit the formation of scale and sludge;
c) to inhibit the growth of microbiological organisms;
d) to maintain the engineering design specifications and energy efficiency of the system;
e) to restore energy efficiency of the system where appropriate.

[0005] The addition of inhibitor or cleaning chemicals to open and closed systems can be problematic. It can be difficult to add the chemicals to the systems and time consuming. Often draining systems down to release pressure is required before addition can take place. This is followed by adding either liquids or slurries to a point within the system. This operation is messy and spillages are often. After the chemical addition, the system is refilled and the system vented to remove air. All of the aforementioned operations are time consuming and disruptive. It is for these reasons that the majority of open and closed systems remain untreated with water treatment chemicals.

[0006] While newly built water boilers can be provided with appropriate dosing points, such features are generally not found in existing open or closed systems. It would also be potentially dangerous for home owners to work on a new water boiler when not trained to do so. Such systems may have standard filling valves or only a threaded cap at the top of the radiator as a possible access point for the introduction of water treatment chemicals to the system.

[0007] While dispensing arrangements and apparatus arrangements are known, for example from WO 2006/018593, they are disadvantageously limited insofar as they represent unnecessarily complicated, possibly inefficient, bulky and slow means for achieving the required dispensing of the product. Also such known arrangements do not include for the facility for the removal of the system water for testing of the alkalinity and acidity levels of the system water. These tests facilitate the determination of the requirement to add water treatment chemicals and also the correct amount of product to be introduced into the system water of the radiator. The testing of the system water prior to the introduction of the product can be critical to the maintenance of the system as a whole and also the energy efficiency of the system. Therefore it is important the correct dosing requirements are adhered too.

[0008] The present invention provides apparatus for, and a method of, inserting chemicals into a radiator system which offer greater benefits for inserting water treatment chemicals into the system without the need for draining down the system, refilling, venting and causing mess. The present invention provides apparatus for, and a method of, removing system water for testing.

[0009] Thus, the present invention provides apparatus for, and a method of, introducing a product into system

water of a radiator and removing system water from a radiator for testing.

Summary of the Invention

[0010] According to a first aspect there is provided Radiator Dosing and Testing Apparatus, comprising: a target arrangement valve body configured to be installed within an access inlet of a radiator, and a product dispensing device; said target arrangement valve body defines a target arrangement passage, and comprises a normally-closed two-way valve member within said target arrangement passage; said product dispensing device comprises an outlet that defines an outlet passage, and a compartment arranged in communication with said outlet, said outlet is provided with an openable closure means, and said compartment is flexible and is presented to receive a manually applied compressive force thereto; said target arrangement valve body presents a female-threaded target arrangement engagement formation, said product dispensing device presents a male-threaded outlet engagement formation, and said male-threaded outlet engagement formation of said product dispensing device and said female-threaded target arrangement engagement formation of said target arrangement valve body are configured to mechanically engage through the rotation of said male-threaded outlet engagement formation into said female-threaded target arrangement engagement formation; said male-threaded outlet engagement formation is rotatable into said female-threaded target arrangement engagement formation into a fully engaged condition in which said target arrangement passage and said outlet passage are in sealed communication; and said target arrangement valve body and said product dispensing device are cooperatively configured such that: rotation of said male-threaded outlet engagement formation into said female-threaded target arrangement engagement formation towards said fully engaged condition opens said normally-closed two-way valve member within said target arrangement passage.

[0011] According to a second aspect there is provided a target arrangement valve body of the first aspect, said target arrangement valve body configured to be installed within an access inlet of a radiator; said target arrangement valve body defining a target arrangement passage; said target arrangement valve body presenting a female-threaded target arrangement engagement formation; and said target arrangement valve body comprising a normally-closed two-way valve member within said target arrangement passage.

[0012] According to a third aspect there is provided a product dispensing device of the first aspect, said product dispensing device comprising an outlet defining an outlet passage and a compartment arranged in communication with said outlet; said product dispensing device presenting a male-threaded outlet engagement formation; said outlet being provided with an openable closure means, and said compartment being flexible and presented to receive a manually applied compressive force thereto.

[0013] According to a fourth aspect there is provided a method of introducing a product into system water of a radiator, said method comprising the steps of: a) identifying a radiator having an access inlet in which a target arrangement valve is installed, said target arrangement valve body defining a target arrangement passage, said target arrangement valve body presenting a female-threaded target arrangement engagement formation, and said target arrangement valve body comprising a normally-closed two-way valve member within said target arrangement passage; b) receiving a product dispensing device comprising an outlet defining an outlet passage and a compartment arranged in communication with said outlet; said product dispensing device presenting a male-threaded outlet engagement formation; said outlet being provided with an openable closure means, and said compartment being flexible and presented to receive a manually applied compressive force thereto; c) rotatably inserting said male-threaded outlet engagement formation of said product dispensing device into said female-threaded target arrangement engagement formation of said target arrangement valve body; and d) manually compressing said compartment of said product dispensing device.

[0014] According to a fifth aspect there is provided a method of removing system water from a radiator, said method comprising the steps of: a) identifying a radiator having an access inlet in which a target arrangement valve is installed, said target arrangement valve body defining a target arrangement passage, said target arrangement valve body presenting a female-threaded target arrangement engagement formation, and said target arrangement valve body comprising a normally-closed two-way valve member within said target arrangement passage; b) receiving a water testing tub comprising an outlet that defines an outlet passage; and a container arranged in communication with said outlet, said water testing tub presenting a male-threaded outlet engagement formation; and c) rotatably inserting said male-threaded outlet engagement formation of said water testing tub into said female-threaded target arrangement engagement formation of said target arrangement valve body.

Brief Description of the Drawings

[0015] For a better understanding of the invention and to show how the same may be carried into effect, there will now be described by way of example only, specific embodiments, methods and processes according to the present invention with reference to the accompanying drawings in which:

Figure 1 shows a valve main body of a target arrangement valve body;

Figure 2 shows a two-way valve member of a target arrangement valve body;

Figure 3 shows a spring of a target arrangement valve body;
Figure 4 shows features of a target arrangement valve body;
Figure 5 illustrates installation of the target arrangement valve body of Figures 1 to 4 within an access inlet of a radiator;
Figure 6 shows the target arrangement valve body of Figures 1 to 4 installed within an access inlet of a radiator;
Figure 7 shows a product dispensing device;
Figure 8 illustrates engagement of the product dispensing device of Figure 7 with the target arrangement valve body of Figures 1 to 4;
Figure 9 shows the product dispensing device of Figure 7 engaged with the target arrangement valve body of Figures 1 to 4;
Figure 10 shows a target arrangement valve body closure cap and illustrates engagement of the target arrangement valve body closure cap with the target arrangement valve body of Figures 1 to 4;
Figure 11 shows a water testing tub and illustrates engagement of the water testing tub with the target arrangement valve body of Figures 1 to 4; and
Figure 12 shows the water testing tub of Figure 11 engaged with the target arrangement valve body of Figures 1 to 4.

Detailed Description

[0016] There will now be described by way of example a specific mode contemplated by the inventors. In the following description numerous specific details are set forth in order to provide a thorough understanding. It will be apparent however, to one skilled in the art, that the present invention may be practiced without limitation to these specific details. In other instances, well known methods and structures have not been described in detail so as not to unnecessarily obscure the description.

[0017] The present invention provides radiator dosing and testing apparatus, and methods of use thereof, for introducing a product into system water of a radiator and removing system water from a radiator. Thus, the present invention provides radiator dosing and testing apparatus, and methods of use thereof, for facilitating maintenance of radiator system water. In particular, the present invention provides radiator dosing and testing apparatus for allowing radiator system water to be tested to determine whether product is to be introduced into the radiator system water and, if so, to determine a quantity of product to be introduced into the radiator system water, and for introducing product into the radiator system water that provides greater convenience of use, provides greater time-efficiency of use, and that reduces spillages.

[0018] A target arrangement valve body and a product dispensing device are provided which are cooperatively configured to be used with each other. A target arrangement valve body and a water testing tub are provided which are cooperatively configured to be used with each other. The radiator and dosing testing apparatus described herein provides an internal sealed flow path between the radiator and the product dispensing device or the water testing tub respectively.

Figures 1 to 4

[0019] The present invention provides a target arrangement valve body configured to be installed within an access inlet of a radiator, the target arrangement valve body defining a target arrangement passage, the target arrangement valve body presenting a female-threaded target arrangement engagement formation, and the target arrangement valve body comprising a normally-closed two-way valve member within said target arrangement passage.

[0020] Figures 1 to 4 illustrate a target arrangement valve body configured to be installed within an access inlet of a radiator. As shown in Figure 1, a target arrangement valve body comprises a valve main body 1. The valve main body 1 presents a male-threaded engagement portion 2. This male screw-threaded portion is configured to engage with the female screw-threaded portion of an access inlet of a radiator to mate the target arrangement valve body with the radiator inlet. The valve main body 1 is provided with an 'O' ring 3 for sealing the valve main body 1 when it is installed within an access inlet of a radiator. An end of the valve main body presents a hexagonal nut 4. The valve main body 1 is configured to be located within an access inlet of a radiator such that the end with the hexagonal nut 4 is on the outside. The valve main body 1 defines a target arrangement passage 5. The valve main body 1 presents a female-threaded target arrangement engagement formation 6. The other end of the valve main body defines a chamfered opening 7. The valve main body 1 is thus configured to be located within an access inlet of a radiator such that the end with the chamfered opening 7 is on the inside. The target arrangement passage 5 is an orifice that extends through the valve main body 1 from the end with the hexagonal nut 4 to the end with the chamfered opening 7. A first internal shoulder 8 is defined within the valve main body 1. A second internal shoulder 9 is defined within the valve main body 1. The target arrangement valve body comprises a normally-closed two-way valve member within the target arrangement passage 5 of the valve main body 1.

[0021] Figure 2 shows a two-way valve member 10. The two-way valve member 10 is provided with an 'O' ring 11. The 'O' ring 11 is located at an end of the two-way valve member 10 that is provided with an end cap 12. The two-way valve member 10 is located within the target arrangement passage 5 of the valve main body 1 such that the end cap 12 is towards the chamfered opening 7. The 'O' ring 11 of the end cap 12 provides the chamfered opening 7 with an air and water tight seal when the two-way valve member 10 is in the closed con-

dition. The two-way valve member 10 comprises a central shaft pin 13 extending from the end with the end cap 12. A shoulder 14 is defined towards the other, distal end of the central shaft pin 13. A puncture point pin portion 15 extends outwardly from the shoulder 14. The puncture point pin portion may have any number of puncture pin points, in any suitable arrangement. The central shaft pin 13 is dimensioned to be so thin as to provide for space between the central shaft pin 13 and the walls of the valve main body 1, to allow flow around the central shaft pin 13 through the target arrangement passage 5. The central shaft pin 13 may be ridged.

[0022] Figure 3 shows a spring 16. The spring 16 is located around the central shaft pin 13 of the two-way valve member 10, between the end cap 12 and the shoulder 14.

[0023] Figure 4 shows the target arrangement valve body, with the two-way valve member in the normally-closed condition. The two-way valve member 10 is biased towards the normally-closed condition by the spring 16.

[0024] The target arrangement valve body may be fabricated from any suitable material or combination of materials. The target arrangement valve body may be fabricated from a metal or a plastics material.

Figures 5 and 6

[0025] Figures 5 and 6 illustrate installation of the target arrangement valve body of Figures 1 to 4 within an access inlet of a radiator.

[0026] Figure 5 shows a section through an access inlet 17 of a radiator. The access inlet is provided with a female-threaded engagement formation 18. Arrow 19 indicates a method of installation of the target arrangement valve body within the access inlet of the radiator. As indicated, the male-threaded engagement formation 2 of the target arrangement valve body and the female-threaded engagement formation 18 of the access inlet of the radiator are configured to mechanically engage through the rotation of the male-threaded engagement formation 2 of the target arrangement valve into the female-threaded engagement formation 17 of the access inlet of the radiator. The target arrangement valve body is configured to be rotatably inserted into the radiator access inlet until the 'O' ring 3 provides a seal between the target arrangement valve body and the radiator. Rotation of the target arrangement valve body within the radiator access inlet may be facilitated through use of a tool, such as a spanner or a wrench, upon the hexagonal nut 4.

[0027] Figure 6 shows the target arrangement valve body installed within the radiator access inlet.

Figure 7

[0028] The present invention provides a product dispensing device comprising an outlet defining an outlet passage and a compartment arranged in communication with the outlet, the product dispensing device presenting a male-threaded outlet engagement formation, said outlet being provided with an openable closure means, and the compartment being flexible and presented to receive a manually applied compressive force thereto.

[0029] Figure 7 illustrates a product dispensing device for use with a target arrangement valve body installed within an access inlet of a radiator. The product dispensing device is configured to contain a product 20, in particular a water treatment product. The outlet of the product dispensing device is provided with an openable closure means, in this example a frangible seal member 21. The openable closure member is normally closed, to prevent evacuation of product from the flexible compartment of the product dispensing device prior to the dispensing device being engaged with the target arrangement valve body. The openable closure means may be of any suitable type and may be fabricated from any suitable material or combination of materials. An openable closure member may be fabricated from a metal or a plastics material. The openable closure means may be reclosable.

[0030] The product dispensing device presents a male-threaded outlet engagement formation 22. At the outlet end of the product dispensing device, an 'O' ring 23 is provided on a flanged collar 24. The product dispensing device comprises a compartment 25 arranged in communication with the outlet 26. The compartment 25 is configured to receive a product to be dispensed through the outlet 26. The compartment 25 is flexible and is configured to receive a manually applied compressive force thereto. In response to receive a compressive force applied manually to the flexible compartment 25, product received therein is dispensed through the outlet 26.

[0031] The product dispensing device may be any suitable type of container or bottle and material. In a specific example, the compartment of the product dispensing device is fabricated from a flexible plastics material. Any soft material suitable for containing a chemical product may be utilised. The product may be any suitable type of water treatment chemical. In an example, the product is a type of water treatment chemical suitable for dosing a closed system such as a water heating system, in particular, a domestic central heating system. In another example, the product is a type of water treatment chemical suitable for dosing an open system such as a water heating system, in particular, a domestic central heating system.

Figures 8 and 9

[0032] Figures 8 and 9 illustrate use of the product dispensing device of Figure 7 with the target arrangement valve body of Figures 1 to 4. In both of these Figures, the target arrangement valve body is installed within an access inlet of a radiator as shown in Figure 6.

[0033] Arrow 27 indicates a method of engagement of

the product dispensing device with the target arrangement valve body. As indicated, the male-threaded outlet engagement formation 22 of the product dispensing device and the female-threaded target arrangement engagement portion 6 of the valve main body 1 of the target arrangement valve body are configured to mechanically engage through the rotation of the male-threaded outlet engagement formation 22 of the product dispensing device into the female-threaded target arrangement engagement formation 6 of the valve main body 1 of the target arrangement valve body.

[0034] The male-threaded outlet engagement formation of the product dispensing device is rotatable into the female-threaded target arrangement engagement formation of the target arrangement valve body into a fully engaged condition in which the target arrangement passage of the target arrangement valve body and the outlet passage of the product dispensing device are in sealed communication. Further, the target arrangement valve body and the product dispensing device are cooperatively configured such that rotation of the male-threaded outlet engagement formation of the product dispensing device into the female-threaded target arrangement engagement formation of the target arrangement valve body towards the fully engaged condition opens the normally-closed two-way valve member within the target arrangement passage of the target arrangement valve body. In addition, the target arrangement valve body and the product dispensing device are cooperatively configured such that rotation of the male-threaded outlet engagement formation of the product dispensing device into the female-threaded target arrangement engagement formation of the target arrangement valve body towards the fully engaged condition brings the puncture point pin portion 15 of the two-way valve member of the target arrangement valve body into contact with the openable closure member 21 of the outlet of the product dispensing device to open the openable closure member. Thus, as the product dispensing device is inserted into the target arrangement valve body, towards the fully engaged condition, the normally-closed two-way valve member of the target arrangement valve body is opened by the product dispensing device and the openable closure member is opened by the normally-closed two-way valve member of the target arrangement valve body. The openable closure member is hence opened as the product dispensing device is brought into engagement with the target arrangement valve body, to prevent undesirable spillage.

[0035] According to the illustrated arrangement, the puncture point pin portion 15 is configured to provide puncture members that first pierce and then tear or rip the openable closure member of the product dispensing device outlet as the product dispensing device is brought into full engagement with the target arrangement valve body.

[0036] As the product dispensing device outlet is fully engaged into the target arrangement valve body, the outlet connects with the shoulder of the central shaft pin of the two-way valve member pushing the central shaft pin of the two-way valve member in the direction into the system radiator. This compresses the spring around the central shaft pin of the two-way valve member. In turn, this moves the end cap and the 'O' ring located on the end cap into the system water; the 'O' ring located on the end cap forms a resilient air and water tight seal and once the two-way valve member is open, the product in the product dispensing device is exposed to the system water.

[0037] When the product dispensing device is fully mated with target arrangement valve body, the product can be manually dispensed from the product dispensing device, by manually compressing the product dispensing device flexible compartment and gently forcing the product by positive pressure through the target arrangement valve body and into the system water. The product dispensing device flexible compartment can be fully compressed such that the entire product has been discharged therefrom.

[0038] Figure 9 shows the product dispensing device in a fully engaged condition within the target arrangement valve body, in which the normally-closed two-way valve member is open and in which the openable closure member is also open. At this stage, 'O' ring 3 provides a seal between the target arrangement valve body and the radiator, and O' ring 23 provides a seal between the product dispensing device and the target arrangement valve body. It can be seen also that the shoulder of the central shaft pin is against the first internal shoulder of the valve main body 1 and that the spring 16 is compressed. The first internal shoulder of the valve main body 1 provides a stop for the central shaft pin. In addition, the shoulder of the central shaft pin, which is configured to be strong and stable, serves to maintain the central shaft pin centrally located within the valve main body. The 'O' ring 23 and the flanged collar 24 act to provide a stable and rigid, air and water tight seal between the outlet 26 of the product dispensing device and the target arrangement valve body.

[0039] In the illustrated operative arrangement of this Figure, product 20 may pass from the flexible compartment 25 into and through the outlet 26 of the product dispensing device, into and through the target passageway of the main valve body 1 of target arrangement valve body, around the two-way valve member 10, through the chamfered opening and into the radiator. The product flows within the apparatus whilst the apparatus is sealed to the outside atmosphere. The target arrangement valve body is configured to provide the product with the least amount of pressure drop to ease the flow of the product into the radiator system.

[0040] Once dispensing is complete, the product dispensing device may then be rotated, in the reverse direction, from the target arrangement valve body and, as the product dispensing device is removed from the target arrangement valve body, the two-way valve member returns to its normally-closed condition.

[0041] As the product dispensing device is disengaged from the target arrangement valve body, main spring around the central shaft pin of the two-way valve member becomes uncompressed, and as the central shaft pin of the two-way valve member is moved away in the direction out of the system radiator, the 'O' ring which is located on the end cap is relocated to the chamfered opening the target arrangement valve body and forms an resilient air and water tight seal.

Figure 10

[0042] The present invention provides a target arrangement valve body closure cap.

[0043] Figure 10 illustrates a target arrangement valve body closure cap for use with the target arrangement valve body of Figures 1 to 4. In this Figure, the target arrangement valve body is installed within an access inlet of a radiator as shown in Figure 6.

[0044] Arrow 28 indicates a method of engagement of the target arrangement valve body closure cap with the target arrangement valve body. An 'O' ring 29 is provided at an end of a male-threaded portion 30 presented by a target arrangement valve body closure cap 31. The target arrangement valve body closure cap 31 presents a hexagonal nut 32. As indicated by arrow 28, the male-threaded target arrangement valve body closure cap and the female-threaded target arrangement engagement formation of the target arrangement valve body are configured to mechanically engage through the rotation of the male-threaded target arrangement valve body closure cap into the female-threaded target arrangement engagement formation.

[0045] The male-threaded target arrangement valve body closure cap is rotatable into the female-threaded target arrangement engagement formation of the target arrangement valve body into a fully engaged condition in which the target arrangement valve body is sealed. Rotation of the target arrangement valve body closure within the target arrangement valve body may be facilitated through use of a tool, such as a spanner or a wrench, upon the hexagonal nut 32. The target arrangement valve body closure cap is useable to prevent dust, dirt and atmosphere from entering into the target arrangement valve body.

Figures 11 and 12

[0046] The present invention provides a water testing tub comprising an outlet that defines an outlet passage, and a container arranged in communication with said outlet.

[0047] Figures 11 and 12 illustrate use of a water testing tub with the target arrangement valve body of Figures 1 to 4. In these Figures, the target arrangement valve body is installed within an access inlet of a radiator as shown in Figure 6.

[0048] Arrow 33 indicates a method of engagement of the water testing tub with the target arrangement valve body. An 'O' ring 34 is provided at an end of a male-threaded outlet engagement formation 35 presented by a water testing tub that has a removable plastic cap 36. The water testing tub presents a hexagonal nut 37. The removable plastic cap 36 is an openable closure means for a water testing tub container 38. As indicated by arrow 33, the male-threaded outlet engagement formation 35 of the water testing tub and the female-threaded target arrangement engagement formation of the main valve body 1 of the target arrangement valve body are configured to mechanically engage through the rotation of the male-threaded outlet engagement formation 35 of the water testing tub into the female-threaded target arrangement engagement formation of the main valve body 1 of the target arrangement valve body.

[0049] The male-threaded outlet engagement formation 35 of the water testing tub 38 is rotatable into said female-threaded target arrangement engagement formation of the main valve body 1 of the target arrangement valve into a fully engaged condition in which the target arrangement passage and the outlet passage of the water testing tub container 38 are in sealed communication. Further, the water testing tub and the target arrangement valve body are cooperatively configured such that rotation of the male-threaded outlet engagement formation of the water testing tub into the female-threaded target arrangement engagement formation of the target arrangement valve body towards the fully engaged condition opens the normally-closed two-way valve member within the target arrangement passage of the target arrangement valve body. Rotation of the water testing tub within the target arrangement valve body may be facilitated through use of a tool, such as a spanner or a wrench, upon the hexagonal nut 37.

[0050] Figure 12 shows the water testing tub in a fully engaged condition within the target arrangement valve body, in which the normally-closed two-way valve member is open. At this stage, 'O' ring 3 provides a seal between the target arrangement valve body and the radiator, and O' ring 34 provides a seal between the water testing tub and the target arrangement valve body. In the illustrated operative arrangement of this Figure, system water may pass from the radiator through the chamfered opening, into and through the target passageway of the main valve body 1 of the target arrangement valve body, around the two-way valve member, into the water testing tub container 38. The water flows within the apparatus whilst the apparatus is sealed to the outside atmosphere. Once collection of radiator system water is complete, the water testing tub may then be rotated, in the reverse direction, from the target arrangement valve body and, as the water testing tub is removed from the target arrangement valve body, the two-way valve member returns to its normally-closed condition.

[0051] The water testing tub allows system water to be removed without the requirement to drain or shut down the radiator system whilst the radiator system is opera-

tional. The collected system water sample may then be tested to determine if water treatment product is required to be added to the radiator system and, if so, the amount of water treatment product to be introduced into the system water depending upon the system water sample testing results.

[0052] The target arrangement valve body may be fitted to a radiator when the radiator is initially installed, or may alternatively be retrofitted to a radiator. Once the target arrangement valve body is fitted in a radiator access inlet, it may remain there. A target arrangement valve body closure cap may then be used to close off the target arrangement valve body between uses. Thus, when fixed within the body of the system radiator, the target arrangement valve body gives access to the system water for testing of the system water for water treatment chemical levels and, if required, new water treatment chemicals can be easily added in future.

[0053] When fixed within the body of the system radiator, the target arrangement valve body gives access to the system water without the need to drain the whole or part of the radiator system. Further, when fixed within the body of the system radiator, the target arrangement valve body gives access to the system water without loss of pressure within a closed system.

[0054] The target arrangement valve body is useable to provide a radiator access inlet with a normally closed condition, and the product dispensing device and the water testing tub are useable with the target arrangement valve body to open the normally-closed two-way valve member of the target arrangement valve body to allow flow between the radiator and the product dispensing device or the water testing tub respectively in a sealed manner to reduce spillage. The product dispensing device advantageously comprises a manually compressible flexible compartment to allow convenient dispensing of a product into the radiator. The flexible compartment of the product dispensing device not only provides for simple dispensing, but allows provides visual and tactile feedback to a user as to the amount of product remaining therein.

[0055] Thus, a target arrangement valve body comprising a normally-closed two-way valve member is provided, for location within a radiator access inlet. A product dispensing device and a water testing tub are provided, for use with the target arrangement valve body. As the product dispensing device and water testing tub are inserted into the target arrangement valve body, the normally-closed two-way valve member opens, to expose the radiator system water to the product dispensing device or water testing tub respectively. As the product dispensing device and water testing tub are retracted from the target arrangement valve body, the open two-way valve member returns to its normally-closed condition, to shut the radiator system water off from the product dispensing device or water testing tub respectively and also to seal the radiator system water from the atmosphere.

[0056] Hence, the present invention provides a method of introducing a product into system water of a radiator, the method comprising the steps of: identifying a radiator having an access inlet in which a target arrangement valve is installed, the target arrangement valve body defining a target arrangement passage, the target arrangement valve body presenting a female-threaded target arrangement engagement formation, and the target arrangement valve body comprising a normally-closed two-way valve member within said target arrangement passage; receiving a product dispensing device comprising an outlet defining an outlet passage and a compartment arranged in communication with the outlet, the product dispensing device presenting a male-threaded outlet engagement formation, the outlet being provided with an openable closure means, and the compartment being flexible and presented to receive a manually applied compressive force thereto; rotatably inserting the male-threaded outlet engagement formation of the product dispensing device into the female-threaded target arrangement engagement formation of said target arrangement valve body; and manually compressing the compartment of the product dispensing device.

[0057] Hence, the present invention also provides a method of removing system water from a radiator, the method comprising the steps of: identifying a radiator having an access inlet in which a target arrangement valve is installed, the target arrangement valve body defining a target arrangement passage, the target arrangement valve body presenting a female-threaded target arrangement engagement formation, and the target arrangement valve body comprising a normally-closed two-way valve member within said target arrangement passage; receiving a water testing tub comprising an outlet that defines an outlet passage; and a container arranged in communication with the outlet, the water testing tub presenting a male-threaded outlet engagement formation; and rotatably inserting the male-threaded outlet engagement formation of the water testing tub into the female-threaded target arrangement engagement formation of the target arrangement valve body.

Claims

1. Radiator Dosing and Testing Apparatus, comprising:

a target arrangement valve body (1) configured to be installed within an access inlet (17) of a radiator, and
a product dispensing device;
said target arrangement valve body (1) defines a target arrangement passage (5), and comprises a normally-closed two-way valve member (10) within said target arrangement passage (5);
said product dispensing device comprises an outlet (26) that defines an outlet passage, and a compartment (25) arranged in communication

with said outlet (26),
said outlet (26) is provided with an openable closure means (21),
said target arrangement valve body (1) presents a female-threaded target arrangement engagement formation (6),
said product dispensing device presents a male-threaded outlet engagement formation (22), and said male-threaded outlet engagement formation (22) of said product dispensing device and said female-threaded target arrangement engagement formation (6) of said target arrangement valve body (1) are configured to mechanically engage through the rotation of said male-threaded outlet engagement formation (22) into said female-threaded target arrangement engagement formation (6);
said male-threaded outlet engagement formation (22) is rotatable into said female-threaded target arrangement engagement formation (6) into a fully engaged condition in which said target arrangement passage (5) and said outlet passage (26) are in sealed communication; and
said target arrangement valve body (1) and said product dispensing device are cooperatively configured such that:

rotation of said male-threaded outlet engagement formation (22) into said female-threaded target arrangement engagement formation (6) towards said fully engaged condition opens said normally-closed two-way valve member (10) within said target arrangement passage (5);
characterized in that said compartment (25) is flexible and is presented to receive a manually applied compressive force thereto.

2. Radiator Dosing and Testing Apparatus as claimed in claim 1, wherein said compartment (25) of said product dispensing device is fabricated from a flexible plastics material.

3. Radiator Dosing and Testing Apparatus as claimed in claim 1 or claim 2, wherein:

said openable closure means (21) of said outlet (26) of said product dispensing device comprises a frangible seal member,
said normally-closed two-way valve member (10) comprises a central pin (13) presenting a puncture point pin portion (15) at an end thereof, and
said target arrangement valve body (1) and said product dispensing device are cooperatively configured such that:

rotation of said male-threaded outlet engagement formation (22) into said female-threaded target arrangement engagement formation (6) towards said fully engaged condition brings said puncture point pin portion (15) into contact with said frangible seal member to open said openable closure means (21).

4. Radiator Dosing and Testing Apparatus as claimed in any preceding claim, wherein said normally-closed two-way valve member (10) is biased towards said normally-closed condition by a spring (16).

5. Radiator Dosing and Testing Apparatus as claimed in any preceding claim, further comprising:

a water testing tub comprising an outlet that defines an outlet passage, and a container arranged in communication with said outlet;
said water testing tub presents a male-threaded outlet engagement formation (35),
said male-threaded outlet engagement formation (35) of said water testing tub and said female-threaded target arrangement engagement formation (6) of said target arrangement valve body (1) are configured to mechanically engage through the rotation of said male-threaded outlet engagement formation (35) into said female-threaded target arrangement engagement formation (6), and
said male-threaded outlet engagement formation (35) is rotatable into said female-threaded target arrangement engagement formation (6) into a fully engaged condition in which said target arrangement passage (5) and said outlet passage are in sealed communication; and
said target arrangement valve body (1) and said water testing tub are cooperatively configured such that:

rotation of said male-threaded outlet engagement formation (35) into said female-threaded target arrangement engagement formation (6) towards said fully engaged condition opens said normally-closed two-way valve member (10) within said target arrangement passage (5).

6. Radiator Dosing and Testing Apparatus as claimed in any preceding claim, further comprising a male-threaded target arrangement valve body closure cap (12), and
said male-threaded target arrangement valve body closure cap (12) and said female-threaded target arrangement engagement formation (6) of said target arrangement valve body (1) are configured to mechanically engage through the rotation of said male-

threaded target arrangement valve body closure cap (12) into said female-threaded target arrangement engagement formation (6), and
said male-threaded target arrangement valve body closure cap (12) is rotatable into said female-threaded target arrangement engagement formation (6) into a fully engaged condition in which said target arrangement valve body (1) is sealed.

7. A product dispensing device of the Radiator Dosing and Testing Apparatus of claim 1,
said product dispensing device comprising an outlet (26) defining an outlet passage, and a compartment (25) arranged in communication with said outlet (26),
said product dispensing device presenting a male-threaded outlet engagement formation (22);
said outlet (26) being provided with an openable closure means (21), and
said compartment (25) being flexible and presented to receive a manually applied compressive force thereto.

8. A method of introducing a product into system water of a radiator using a radiator dosing and testing apparatus according claim 1, said method comprising the steps of:

a) identifying a radiator having an access inlet (17) in which said target arrangement valve body (1) is installed,
b) receiving said product dispensing device comprising an outlet (26) defining an outlet passage and a compartment (25) arranged in communication with said outlet (26);
c) rotatably inserting said male-threaded outlet engagement formation (22) of said product dispensing device into said female-threaded target arrangement engagement formation (6) of said target arrangement valve body; (1) and
d) manually compressing said compartment (25) of said product dispensing device.

9. A method of removing system water from a radiator using a radiator dosing and testing apparatus according claim 5, said method comprising the steps of:

a) identifying a radiator having an access inlet (17) in which said target arrangement valve body (1) is installed,
b) receiving said water testing tub comprising an outlet that defines an outlet passage; and a container arranged in communication with said outlet,
c) rotatably inserting said male-threaded outlet engagement formation (35) of said water testing tub into said female-threaded target arrangement (6) engagement formation of said target arrangement valve body (1).

Patentansprüche

1. Radiatordosierungs- und -testvorrichtung, umfassend:

einen Zielanordnungs-Ventilkörper (1), welcher gestaltet ist, um in einem Zugangseinlass (17) eines Radiators installiert zu werden, und eine Produktverteileinrichtung,
wobei der Zielanordnungs-Ventilkörper (1) einen Zielanordnungsdurchgang (5) festlegt und ein normalerweise geschlossenes Zweiwegeventilglied (10) innerhalb des Zielanordnungsdurchgangs (5) umfasst,
wobei die Produktverteileimichtung einen Auslass (26), der einen Auslassdurchgang festlegt, und eine Kammer (25) umfasst, die mit dem Auslass (26) in Verbindung angeordnet ist,
wobei der Auslass (26) mit einer öffnungsfähigen Verschließeinrichtung (21) versehen ist,
wobei der Zielanordnungs-Ventilkörper (1) ein Innengewinde-Zielanordnungseingreifgebilde (6) enthält,
wobei die Produktverteileimichtung ein Außengewinde-Auslasseingreifgebilde (22) enthält,
wobei das Außengewinde-Auslasseingreifgebilde (22) der Produktverteileinrichtung und das Innengewinde-Zielanordnungseingreifgebilde (6) des Zielanordnungs-Ventilkörpers (1) gestaltet sind, um durch Drehen des Außengewinde-Auslasseingreifgebildes (22) in das Innengewinde-Zielanordnungseingreifgebilde (6) mechanisch einzugreifen,
wobei das Außengewinde-Auslasseingreifgebilde (22) in das Innengewinde-Zielanordnungseingreifgebilde (6) in einen völlig eingegriffenen Zustand drehbar ist, in welchem der Zielanordnungsdurchgang (5) und der Auslassdurchgang (26) sich in abgedichteter Verbindung befinden,
und wobei der Zielanordnungs-Ventilköiper (1) und die Produktverteileinrichtung derart gemeinsam gestaltet sind, dass ein Drehen des Außengewinde-Auslasseingreifgebildes (22) in das Innengewinde-Zielanordnungseingreifgebilde (6) zu dem vollständig eingegriffenen Zustand das normalerweise geschlossene Zweiwegeventilglied (10) innerhalb des Zielanordnungsdurchgangs (5) öffnet, **dadurch gekennzeichnet, dass** die Kammer (25) flexibel ist und vorhanden ist, um eine auf sie manuell ausgeübte Druckkraft aufzunehmen.

2. Radiatordosierungs- und -testvorrichtung nach Anspruch 1, wobei die Kammer (25) der Produktverteileinrichtung aus einem flexiblen Kunststoffmaterial hergestellt ist.

3. Radiatordosierungs- und -testvorrichtung nach An-

spruch 1 oder 2, wobei die öffnungsfähige Verschließeinrichtung (21) des Auslasses (26) der Produktverteileinrichtung ein brechbares Dichtungsglied umfasst,
wobei das normalerweise geschlossene Zweiwegeventilglied (10) einen Mittelstift (13) umfasst, der an seinem einen Ende einen Durchbruchspunkt-Stiftteil (15) enthält,
und wobei der Zielanordnungs-Ventilkörper (1) und die Produktverteileinrichtung derart gemeinsam gestaltet sind,
dass ein Drehen des Außengewinde-Auslasseingreifgebildes (22) in das Innengewinde-Zielanordnungseingreifgebilde (6) zu dem vollständig eingegriffenen Zustand den Durchstechpunk-Stiftteil (15) mit dem brechbaren Dichtungsglied in Kontakt bringt, um die öffnungsfähige Verschließeinrichtung (21) zu öffnen.

4. Radiatordosierungs- und -testvorrichtung nach irgendeinem vorhergehenden Anspruch, wobei das normalerweise geschlossene Zweiwegeventilglied (10) mittels einer Feder (16) zu dem normalerweise geschlossenen Zustand hin vorgespannt ist.

5. Radiatordosierungs- und -testvorrichtung nach irgendeinem vorhergehenden Anspruch, ferner umfassend:

eine Wasser-Testwanne, die einen einen Auslassdurchgang festlegenden Auslass und einen Behälter umfasst, der mit dem Auslass in Verbindung steht,
wobei die Wasser-Testwanne ein Außengewinde-Auslasseingreifgebilde (35) enthält,
wobei das Außengewinde-Auslasseingreifgebilde (35) der Wasser-Testwanne und das Innengewinde-Zielanordnungseingreifgebilde (6) des Zielanordnungs-Ventilkörpers (1) gestaltet sind, um durch Drehen des Außengewinde-Auslasseingreifgebildes (35) in das Innengewinde-Zielanordnungseingreifgebilde (6) mechanisch einzugreifen,
wobei das Außengewinde-Auslasseingreifgebilde (35) in das Innengewinde-Zielanordnungseingreifgebilde (6) in einen vollständig eingegriffenen Zustand drehbar ist, in welchem der Zielanordnungsdurchgang (5) und der Auslassdurchgang sich in abgedichteter Verbindung befinden,
und wobei der Zielanordnungs-Ventilkörper (1) und die Wasser-Testwanne gemeinsam derart gestaltet sind,
dass ein Drehen des Außengewinde-Auslasseingreifgebildes (35) in das Innengewinde-Zielanordnungseingreifgebilde (6) zu dem vollständig eingegriffenen Zustand hin das normalerweise geschlossene Zweiwegeventilglied (10) innerhalb des Zielanordnungsdurchgangs (5) öffnet.

6. Radiatordosierungs- und -testvorrichtung nach irgendeinem vorhergehenden Anspruch, ferner umfassend eine Verschlusskappe (12) des Außengewinde-Zielanordnungsventilkörpers,
wobei die Verschlusskappe (12) des Außengewinde-Zielanordnungsventilkörpers und das Innengewinde-Zielanordnungseingreifgebilde (6) des Zielanordnungs-Ventilkörpers (1) gestaltet sind, um durch Drehen der Verschlusskappe (12) des Außengewinde-Zielanordnungsventilkörpers in das Innengewinde-Zielanordnungseingreifgebilde (6) mechanisch einzugreifen,
und wobei die Verschlusskappe (12) des Außengewinde-Zielanordnungsventilkörpers in das Innengewinde-Zielanordnungseingreifgebilde (6) in einen vollständig eingegriffenen Zustand drehbar ist, in welchem der Zielanordnungs-Ventilköiper (1) abgedichtet ist.

7. Produktverteilvorrichtung der Radiatordosierungs- und -testvorrichtung nach Anspruch 1,
wobei die Produktverteileinuchtung einen einen Auslassdurchgang festlegenden Auslass (26) und eine Kammer (25) umfasst, die mit dem Auslass (26) in Verbindung angeordnet ist,
wobei die Produktverteileimichtung ein Außengewinde-Auslasseingreifgebilde (22) enthält,
wobei der Auslass (26) mit einer öffnungsfähigen Verschließeinrichtung (21) versehen ist
und wobei die Kammer (25) flexibel und so vorhanden ist, um eine auf sie manuell ausgeübte Druckkraft aufzunehmen.

8. Verfahren zum Einführen eines Produkts in ein Systemwasser eines Radiators unter Verwendung einer Radiatordosierungs- und -testvorrichtung nach Anspruch 1, wobei das Verfahren die Schritte umfasst:

a) Identifizieren eines Radiators, der einen Zugangseinlass (17) aufweist, in welchem der Zielanordnungs-Ventilkörper (1) installiert ist,
b) Aufnehmen der Produktverteileinrichtung, die einen einen Auslassdurchgang festlegenden Auslass (26) und eine Kammer (25) umfasst, welche mit dem Auslass (26) in Verbindung angeordnet ist,
c) drehbares Einführen des Außengewinde-Auslasseingreifgebildes (22) der Produktverteileinrichtung in das Innengewinde-Zielanordnungseingreifgebilde (6) des Zielanordnungs-Ventilkörpers (1) und
d) manuelles Zusammendrücken der Kammer (25) der Produktverteileinrichtung.

9. Verfahren zum Entfernen von Systemwasser aus ei-

nem Radiator unter Verwendung einer Radiatordosierungs- und -testvorrichtung nach Anspruch 5, wobei das Verfahren die Schritte umfasst:

a) Identifizieren eines Radiators, der einen Zugangseinlass (17) aufweist, in welchem der Zielanordnungs-Ventilkörper (1) installiert ist,
b) Aufnehmen der Wasser-Testwanne, die einen einen Auslassdurchgang festlegenden Auslass und einen Behälter umfasst, der mit dem Auslass in Verbindung angeordnet ist,
c) drehbares Einführen des Außengewinde-Auslasseingreifgebildes (35) der Wasser-Testwanne in das Innengewinde-Zielanordnungseingreifgebilde (6) des Zielanordnungs-Ventilkörpers (1).

Revendications

1. Appareil de dosage et d'essai de radiateur, comprenant :

un corps de vanne d'agencement cible (1) configuré pour être installé dans un orifice d'entrée d'accès (17) d'un radiateur, et
un dispositif de distribution de produit,
ledit corps de vanne d'agencement cible (1) définit un passage d'agencement cible (5), et comprend un élément de vanne à deux voies normalement fermée (10) dans ledit passage d'agencement cible (5),
ledit dispositif de distribution de produit comprend un orifice de sortie (26) qui définit un passage d'orifice de sortie, et un compartiment (25) disposé en communication avec ledit orifice de sortie (26),
ledit orifice de sortie (26) est doté d'un moyen de fermeture ouvrable (21),
ledit corps de vanne d'agencement cible (1) présente une formation d'engagement d'agencement cible à filetage femelle (6),
ledit dispositif de distribution de produit présente une formation d'engagement d'orifice de sortie à filetage mâle (22), et
ladite formation d'engagement d'orifice de sortie à filetage mâle (22) dudit dispositif de distribution de produit et ladite formation d'engagement d'agencement cible à filetage femelle (6) dudit corps de vanne d'agencement cible (1) sont configurées pour s'engager mécaniquement par la rotation de ladite formation d'engagement d'orifice de sortie à filetage mâle (22) dans ladite formation d'engagement d'agencement cible à filetage femelle (6),
ladite formation d'engagement d'orifice de sortie à filetage mâle (22) peut tourner dans ladite formation d'engagement d'agencement cible à filetage femelle (6) jusqu'à un état totalement engagé dans lequel ledit passage d'agencement cible (5) et ledit passage d'orifice de sortie (26) sont en communication étanche, et
ledit corps de vanne d'agencement cible (1) et ledit dispositif de distribution de produit sont configurés de manière coopérative de sorte que :

une rotation de ladite formation d'engagement d'orifice de sortie à filetage mâle (22) dans ladite formation d'engagement d'agencement cible à filetage femelle (6) en direction dudit état totalement engagé ouvre ledit élément de vanne à deux voies normalement fermée (10) dans ledit passage d'agencement cible (5),
caractérisé en ce que ledit compartiment (25) est flexible et est présenté pour recevoir une force de compression appliquée manuellement à celui-ci.

2. Appareil de dosage et d'essai de radiateur selon la revendication 1, dans lequel ledit compartiment (25) dudit dispositif de distribution de produit est fabriqué à partir d'un matériau de matière plastique flexible.

3. Appareil de dosage et d'essai de radiateur selon la revendication 1 ou la revendication 2, dans lequel :

ledit moyen de fermeture ouvrable (21) dudit orifice de sortie (26) dudit dispositif distribution de produit comprend un élément d'étanchéité pouvant être rompu,
ledit élément de vanne à deux voies normalement fermée (10) comprend une broche centrale (13) présentant une partie de broche de point de perforation (15) à une extrémité de celle-ci, et
ledit corps de vanne d'agencement cible (1) et ledit dispositif de distribution de produit sont configurés de manière coopérative de sorte que :

une rotation de ladite formation d'engagement d'orifice de sortie à filetage mâle (22) dans ladite formation d'engagement d'agencement cible à filetage femelle (6) en direction dudit état totalement engagé amène ladite partie de broche de point de perforation (15) en contact avec ledit élément d'étanchéité pouvant être rompu pour ouvrir ledit moyen de fermeture ouvrable (21).

4. Appareil de dosage et d'essai de radiateur selon l'une quelconque des revendications précédentes, dans lequel ledit élément de vanne à deux voies normalement fermée (10) est sollicité en direction dudit état normalement fermé par un ressort (16).

5. Appareil de dosage et d'essai de radiateur selon

l'une quelconque des revendications précédentes, comprenant en outre :

une cuve d'essai à eau comprenant un orifice de sortie qui définit un passage d'orifice de sortie, et un récipient disposé en communication avec ledit orifice de sortie,
ladite cuve d'essai à eau présente une formation d'engagement d'orifice de sortie à filetage mâle (35),
ladite formation d'engagement d'orifice de sortie à filetage mâle (35) de ladite cuve d'essai à eau et ladite formation d'engagement d'agencement cible à filetage femelle (6) dudit corps de vanne d'agencement cible (1) sont configurées pour s'engager mécaniquement par la rotation de ladite formation d'engagement d'orifice de sortie à filetage mâle (35) dans ladite formation d'engagement d'agencement cible à filetage femelle (6), et
ladite formation d'engagement d'orifice de sortie à filetage mâle (35) peut tourner dans ladite formation d'engagement d'agencement cible à filetage femelle (6) jusqu'à un état totalement engagé dans lequel ledit passage d'agencement cible (5) et ledit passage d'orifice de sortie sont en communication étanche, et
ledit corps de vanne d'agencement cible (1) et ladite cuve d'essai à eau sont configurés de manière coopérative de sorte que :

une rotation de ladite formation d'engagement d'orifice de sortie à filetage mâle (35) dans ladite formation d'engagement d'agencement cible à filetage femelle (6) en direction dudit état totalement engagé ouvre ledit élément de vanne à deux voies normalement fermée (10) dans ledit passage d'agencement cible (5).

6. Appareil de dosage et d'essai de radiateur selon l'une quelconque des revendications précédentes, comprenant en outre un bouchon de fermeture de corps de vanne d'agencement cible à filetage mâle (12), et
ledit bouchon de fermeture de corps de vanne d'agencement cible à filetage mâle (12) et ladite formation d'engagement d'agencement cible à filetage femelle (6) dudit corps de vanne d'agencement cible (1) sont configurés pour s'engager mécaniquement par la rotation dudit bouchon de fermeture de corps de vanne d'agencement cible à filetage mâle (12) dans ladite formation d'engagement d'agencement cible à filetage femelle (6), et
ledit bouchon de fermeture de corps de vanne d'agencement cible à filetage mâle (12) peut tourner dans ladite formation d'engagement d'agencement cible à filetage femelle (6) jusqu'à un état totalement engagé dans lequel ledit corps de vanne d'agencement cible (1) est fermé de manière étanche.

7. Dispositif de distribution de produit de l'appareil de dosage et d'essai de radiateur selon la revendication 1,
ledit dispositif de distribution de produit comprenant un orifice de sortie (26) définissant un passage d'orifice de sortie, et un compartiment (25) disposé en communication avec ledit orifice de sortie (26),
ledit dispositif de distribution de produit présentant une formation d'engagement d'orifice de sortie à filetage mâle (22),
ledit orifice de sortie (26) étant doté d'un moyen de fermeture ouvrable (21), et
ledit compartiment (25) étant flexible et présenté pour recevoir une force de compression appliquée manuellement à celui-ci.

8. Procédé d'introduction d'un produit dans de l'eau de circuit d'un radiateur en utilisant un appareil de dosage et d'essai de radiateur selon la revendication 1, ledit procédé comprenant les étapes consistant à :

a) identifier un radiateur ayant un orifice d'entrée d'accès (17) dans lequel ledit corps de vanne d'agencement cible (1) est installé,
b) recevoir ledit dispositif de distribution de produit comprenant un orifice de sortie (26) définissant un passage d'orifice de sortie et un compartiment (25) disposé en communication avec ledit orifice de sortie (26),
c) insérer avec possibilité de rotation ladite formation d'engagement d'orifice de sortie à filetage mâle (22) dudit dispositif de distribution de produit dans ladite formation d'engagement d'agencement cible à filetage femelle (6) dudit corps de vanne d'agencement cible (1), et
d) compresser manuellement ledit compartiment (25) dudit dispositif de distribution de produit.

9. Procédé d'enlèvement de l'eau de circuit dans un radiateur en utilisant un appareil de dosage et d'essai de radiateur selon la revendication 5, ledit procédé comprenant les étapes consistant à :

a) identifier un radiateur ayant un orifice d'entrée d'accès (17) dans lequel ledit corps de vanne d'agencement cible (1) est installé,
b) recevoir ladite cuve d'essai à eau comprenant un orifice de sortie qui définit un passage d'orifice de sortie, et un récipient disposé en communication avec ledit orifice de sortie,
c) insérer avec possibilité de rotation ladite formation d'engagement d'orifice de sortie à filetage mâle (35) de ladite cuve d'essai à eau dans ladite formation d'engagement d'agencement

cible à filetage femelle (6) dudit corps de vanne d'agencement cible (1).

Fig 1.

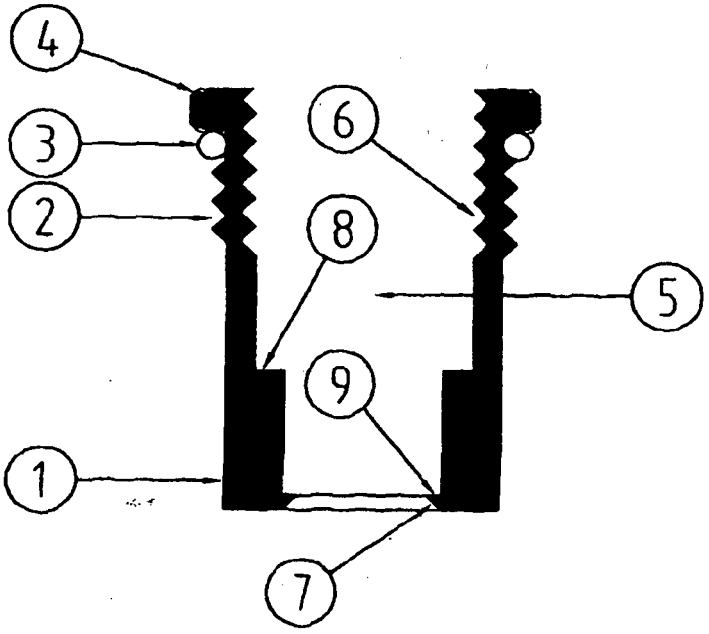


Fig 2.

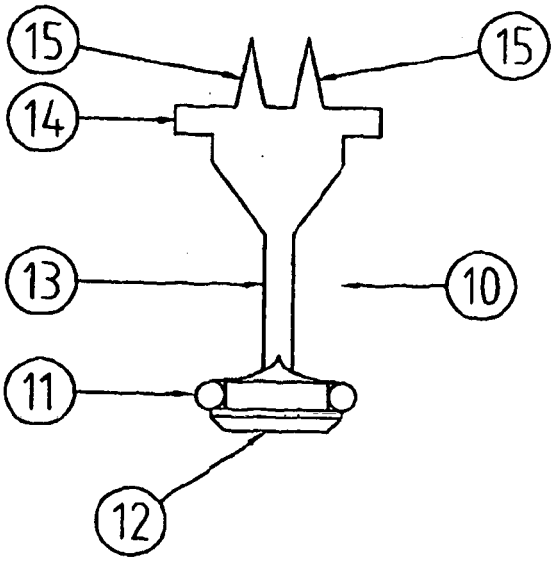


Fig 3.

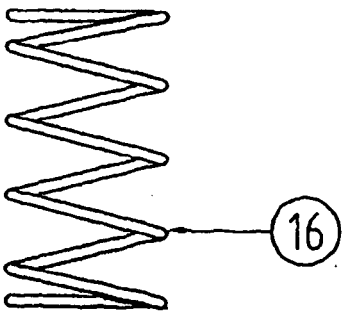


Fig 4.

Fig 5.

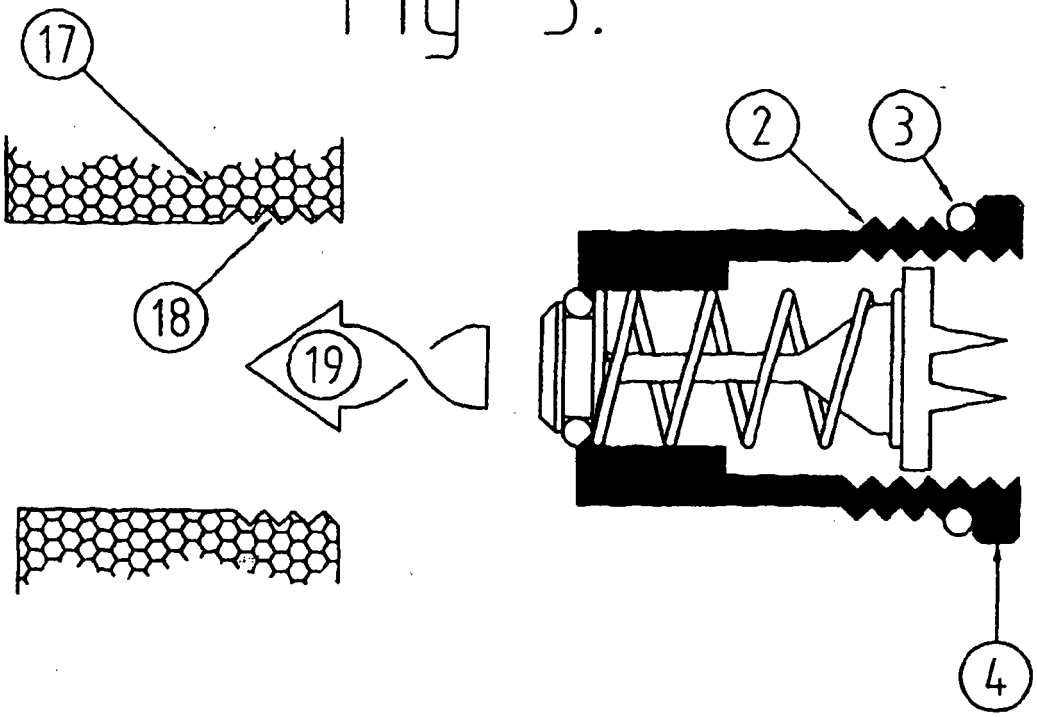


Fig 6.

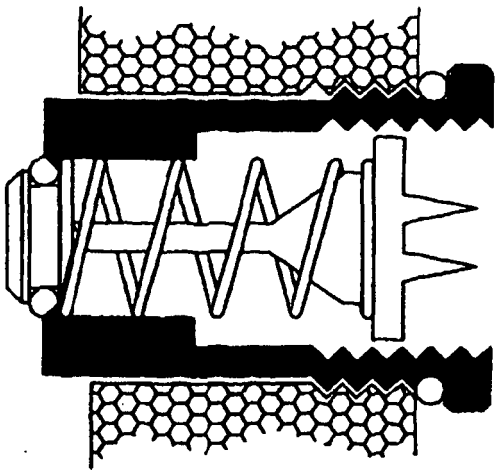


Fig 7.

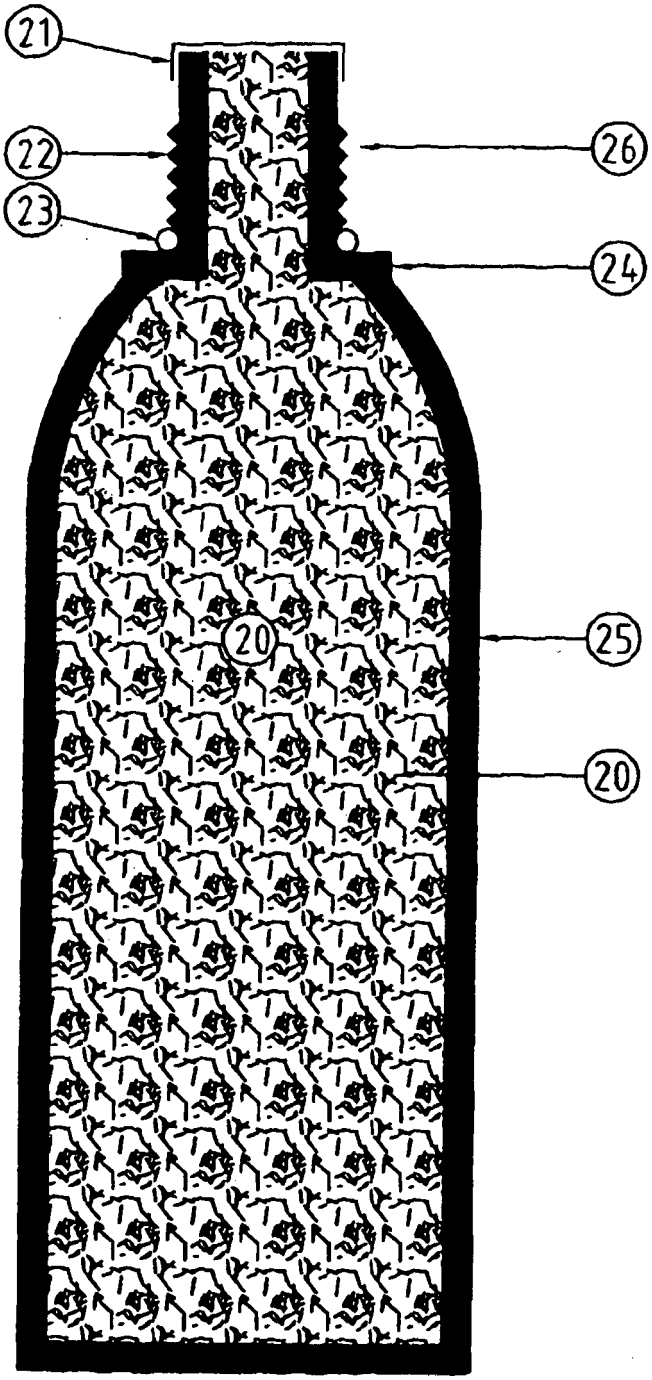


Fig 8.

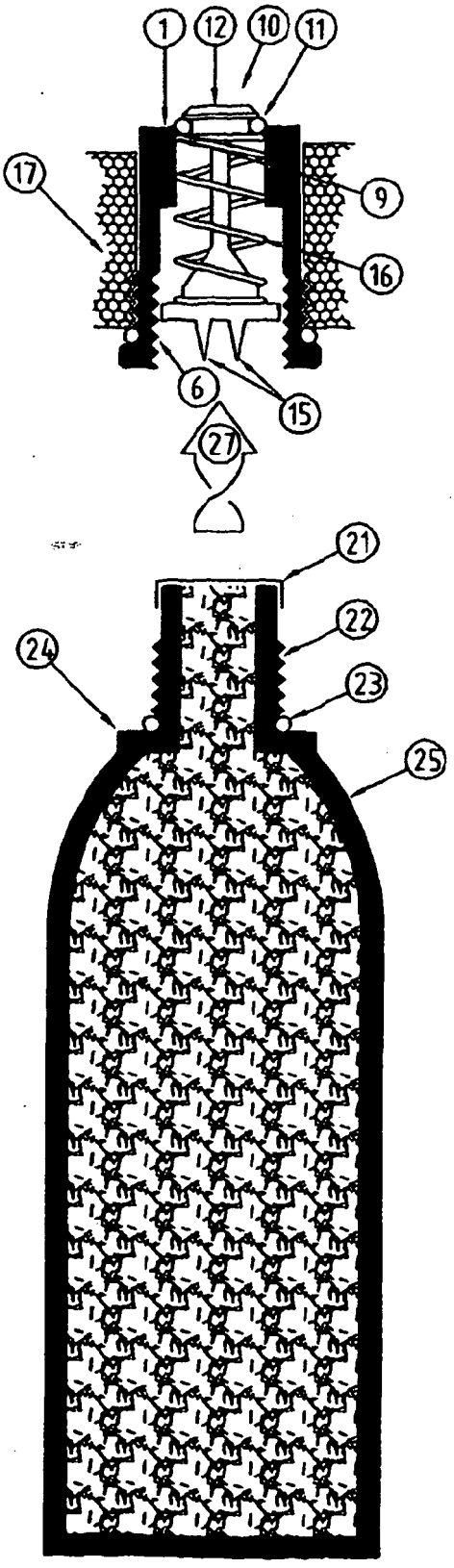


Fig 9.

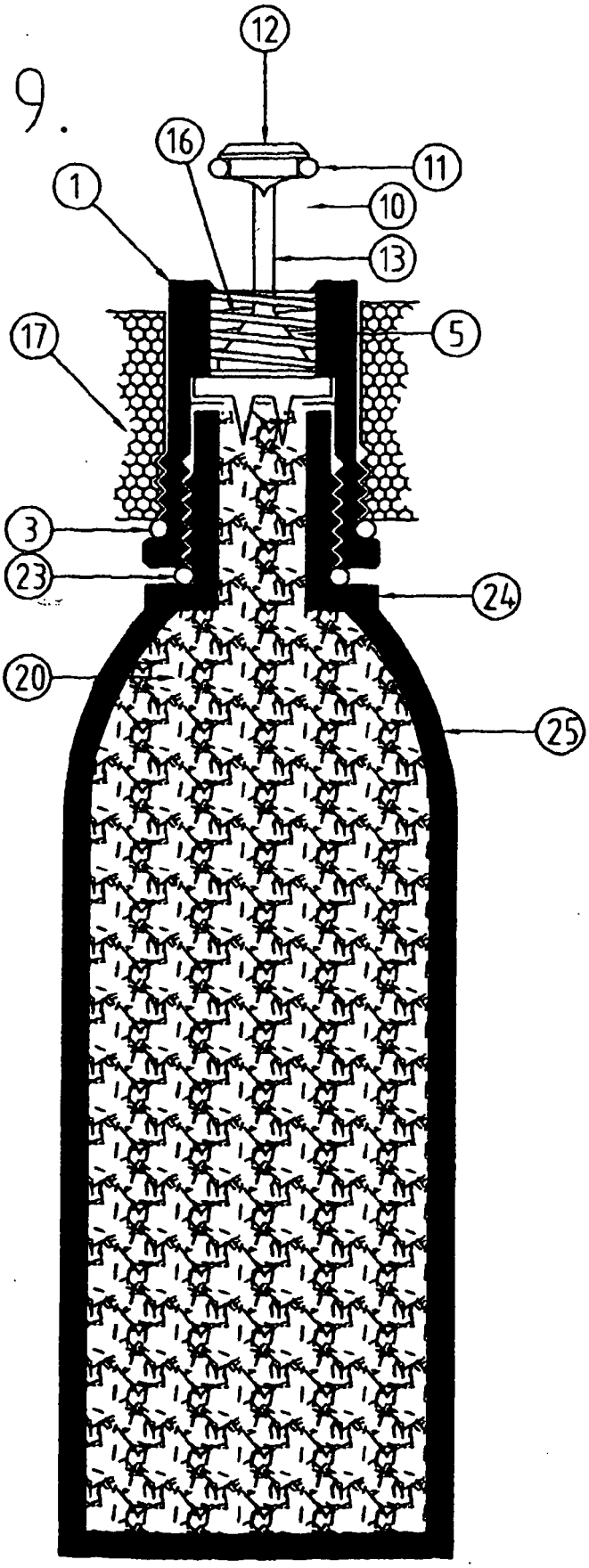


Fig 10.

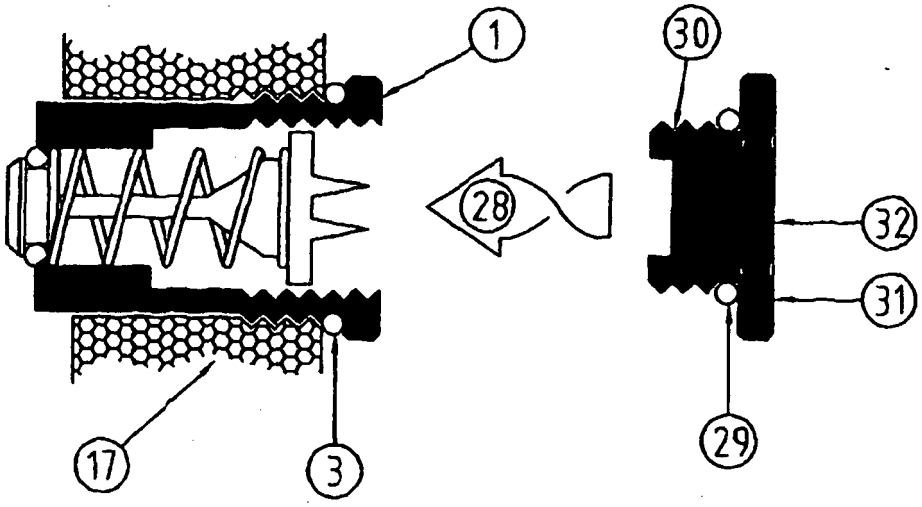


Fig 11.

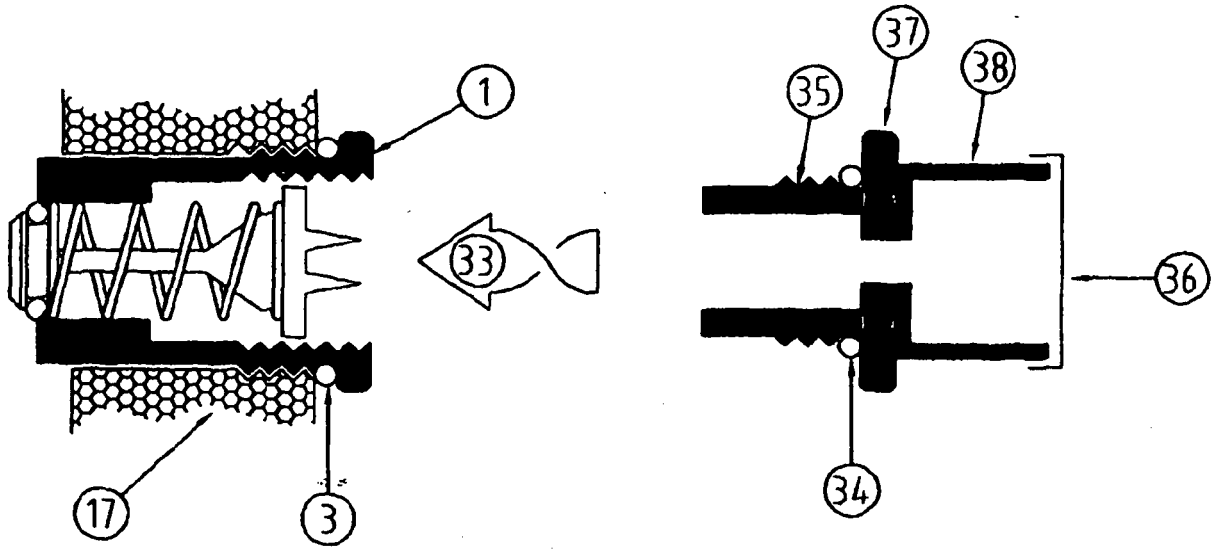
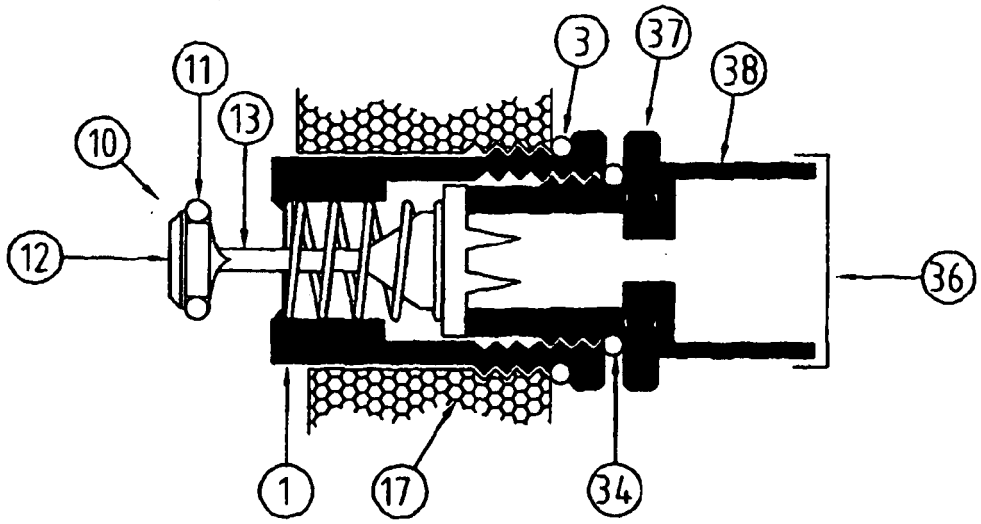


Fig 12.



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Patent documents cited in the description

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