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(54) A HOUSE HEATING SYSTEM.

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Description

The present invention relates to a house heating system where the heat transfer medium is water, said system comprising at least one circulation circuit with a plurality of elements each having two connection conduits which are respectively a supply conduit connected to a mains, and a return conduit.

The rise in energy prices has led to higher demands being made on the effective control of heating systems for house heating, especially in systems where the heat transfer medium is water. In a building with several flats, but without control facilities, considerable temperature differences may thus exist between the coldest and the warmest flat. As a result, the fuel consumption will be unnecessarily high because the coldest flat more often than not is allowed to determine the heat supply, the excess heat in the warmer flats being eliminated by airing. Furthermore, the large temperature differences between the flats make it impossible to achieve a desired total reduction of the room temperatures.

By adjusting the water flow, a heat distribution can be obtained which gives a very insignificant temperature difference between the coldest and the warmest flat, and this means that also the room temperature can be generally lowered without difficulty, and in this manner also the heat costs can be reduced.

In heating systems where the heat transfer medium is water, flow adjustment is made conventionally by means of mains control valves by which the flow in every circuit of the system can be adjusted. A complication in this respect is that the pumping pressure varies with the distance between the pump and the radiators so that the pressure drop to the circuit taking up the least advantageous position will have control of all circuits. In such conventionally operating systems, the major part of the pressure losses thus lies in the conduits, whereas the pressure drops in the valves of the radiators are comparatively small.

An alternative to the mains control valves of conventional flow adjustment are high-throttling adjustment means mounted on each radiator. This last-mentioned technique aims at reducing the generally occurring and, in many cases, heavy over-dimensioning of heating systems. its advantages are that the pressure drop in the piping up to the adjustment means, if these are correctly set, can be made negligible so that the desired flow can be established wholly in proportion to the size of the radiators. The technique also causes a higher temperature drop across the radiators and thus a higher radiation yield than with conventional flow control. Another advantages is that a wide control area is obtained.

In its practical application, the alternative technique requires presettable radiator valves or return valves. However, the accuracy of these valves, especially in existant older systems, is not such that the desired k_v values (valve coefficient values) definitely are obtained. Furthermore, there is a considerable risk, upon exchange of valves, that the requisite presetting is neglected, whereby the flow conditions in the system may be drastically changed.

The prior art is illustrated by the following documents.

US—A—2 249 469 relates to soldered joints between copper tubes and discloses an orifice element which can be permanently assembled in joints of the type in which the pipe is telescoped into the socket of the fitting and secured by solder flowed into the capillary space between the pipe and the internal wall of the socket.

US—A—2 244 311 describes a fixed-flow-reducing orifice in steam heating systems. There is provided a flow-reducing orifice in the form of a cup-shaped member having a bottom provided with an orifice, a cylindrical side wall portion, and an outwardly extending flange, the member being adapted for insertion in a valve with the flange of the member seated on the valve seat and with the cylindrical side wall portion extending along the valve passage beyond the valve seat, the member being secured in the valve by laterally expanding that portion of the side walls of the member beyond the valve seat.

US—A—3 517 700 discloses a compensating element for hydrostatic bearings, said element comprising a jewel disc which is placed in a cylindrical bore by means of two sleeves deforming an elastic ring in which the disc is held in position in a shock-proof manner. The elastic ring is here used to prevent the brittle disc from being crushed under the action of a mechanical shock.

DE—A—2 315 195 discloses a plastic nipple with a passage therethrough forming an angle with the horizontal longitudinal axis of the nipple to prevent undesired circulation of water.

The present invention has for its object to provide a system of the type referred to by way of introduction, said system obviating the disadvantages encountered in present-day application of the alternative flow control technique.

To this end, the system referred to by way of introduction is given the characteristic features stated in the appended claim 1. Presently preferred embodiments of the apparatus according to the invention will appear from the appended sub-claims.

By utilizing a fixed throttling means, it is possible to obtain the exact calculated flow. Furthermore, the fixed throttling means also precludes incorrect presetting caused by, for example, a reading error.

The concealed mounting makes it impossible for unauthorized persons to interfere with the setting, and all excess consumption of energy can be safely prevented. Moreover, the once-and-for-all throttling by the fixed throttling means is not affected upon exchange of valves, for which reason there is no risk that a correctly made setting will be changed.

By providing, in accordance with the present invention, the throttling means with an outer

resilient sleeve, preferably of rubber, a desired damping is achieved of the noise that may arise in the throttling means due to the high flow rate therein and ensuing heavy pressure drops. Further, because of its two-part construction, the throttling means can be adapted to all coupling components available on the market, with relatively few variants of outer and inner sleeves.

By the system according to the present invention, complete application of the above-mentioned alternative technique and modifications thereof are made possible.

The invention will be described in greater detail below, reference being had to the accompanying drawings in which Fig. 1 shows part of a heating system in which the heat transfer medium is water, Fig. 2 shows part of a heating medium system, Figs. 3 and 4 are respectively an end view and a longitudinal section of a throttling means according to the invention, and Figs. 5 and 6 show alternative embodiments of the outer sleeve of the throttling means.

The part of the heating system shown in Fig. 1 comprises a radiator 1 having a supply conduit 2 and a return conduit 3. A radiator valve 4 is mounted in the supply conduit, and a fixed throttling means 5 according to the present invention is mounted on the radiator side of this valve 4. More particularly, the throttling means 5 is mounted in a coupling member of the supply conduit, including the usual elbows.

Fig. 2 illustrates the mounting of the fixed throttling means according to the invention in a heating medium system. A part of this system includes a heating medium battery 6 having a supply conduit 7 and a return conduit 8. A shut-off valve 9 is mounted in the supply conduit, and a fixed throttling means 5 according to the invention is mounted on the battery side of the said valve 9.

In the embodiment according to Fig. 1 and also in the embodiment according to Fig. 2, the fixed throttling means is concealed in a coupling member of the supply conduits 2 and 7, respectively, in that it is insertable coaxially therein so that it is inaccessible to unauthorized persons.

As will appear from Figs. 3 and 4, the throttling means comprises an outer sleeve 10 of resilient material, preferably rubber, and an inner, rigid sleeve 11, preferably of brass. The two sleeves 10 and 11 are essentially cylindrical and are provided each with one end flange 12 and 13, respectively. Furthermore, the outer sleeve 10 has an external shape corresponding to the internal shape of the coupling member in which the throttling means is mounted. Alternative embodiments of the outer sleeve 10 to adapt it to difference cross-sectional shapes of the coupling members and elbows available on the market are shown in Figs. 5 and 6. The outer sleeve 10 has a throughpassage for receiving the inner sleeve 11 which has a central hole 14 having an exactly defined flow-controlling cross-sectional area. The hole 14 has the same diameter along its entire length and a sharp edge at the transition to the end surface at the flange 13. The end surface preferably is planar, at least adjacent the hole 14, the length of which is large in relation to the diameter. A length of the order 10 mm and greater has been found to be practically useful. The special design of the hole 14 guarantees an almost completely silent throttling, also at pressure drops as high as 6—8 meters of water column.

The throughpassage of the outer sleeve 10 has, independently of the external shape of the sleeve, the same cross-sectional area throughout its length. Correspondingly, the exterior shape of the inner sleeve 11 is the same and corresponds to the passage shape of the outer sleeve 10, independently of the size of the precision-drilled hole 14 in the inner sleeve 11. Furthermore, the central hole 14 of the inner sleeve 11 preferably has a cross-sectional area of a value selected from a group of predetermined values. This value is established depending on the desired temperature drop of the heating medium across the radiator, and the pressure available. For example, the inner sleeve may be designed with a selected number of different k_v values in the range 0.02—3.00.

The number of different details required for the apparatus according to the present invention will thus be equal to the sum of the different types of cross-sectional shapes of the coupling members available on the market and the desired number of different cross-sectional areas of the hole 14.

In the following, a number of steps are described to illustrate the precision setting of a heating system according to the invention using water as the heat transfer medium. It is assumed that the radiators mounted are correctly dimensioned. The temperature drop across the radiators, calculated by the designer, is checked and then is adapted to the temperature range of the heating source employed. In this connection, different types of low-temperature systems may be taken into consideration. Based upon the temperature drop established, the requisite flow to the radiators is then calculated, whereupon the pressure available in the system is checked. After that, a suitable pressure drop across the throttling means is selected, and based upon this value and the maximum flow required, the k_v values of the fixed throttling means are calculated. These values are selected individually in relation to the net flow of each radiator. The requisite throttling means are then mounted, whereupon any mains control valves mounted in the system are fully opened. Finally, the temperature drop across the radiators is checked, as is the room temperature. This technique offers great compensation possibilities for individual rooms in which the temperature is too low.

Modifications of the apparatus described above can be made. For example, the throttling means may be mounted on the side of the control or shut-off valve facing away from the radiator, but this variant is not preferred. Likewise, the throttling means may be mounted in the outlet or return conduit, but this usually increases the risk of blocking.

Claims

1. A house heating system where the heat transfer medium is water, said system comprising at least one circulation circuit with a plurality of elements (1; 6) each having two connection conduits (2, 3; 7, 8) which are respectively a supply conduit (2; 7) connected to a mains, and a return conduit (3; 8), characterised in that every element (1; 6) in one of said connection conduits (2, 3; 7, 8) has a coupling member and a fixed throttling means (5) absorbing substantially the entire pressure drop in the circulation circuit, said throttling means being mounted in concealed position in said coupling member and comprising an outer sleeve (10) of resilient material and of an outer shape corresponding to the inner shape of said coupling member, and an inner rigid sleeve (11) carried in a through-passage in said outer sleeve (10) which forms a sound-damping suspension for the inner sleeve and a seal between said inner sleeve and said coupling member, and that said inner sleeve has a central hole of an exactly defined cross-sectional area of a value selected among a group of predetermined values for obtaining a k_v value in the range 0.02—3.00.

2. A heating system as claimed in claim 1, characterised in that the throughpassage of the outer sleeve (10) has the same cross-sectional shape throughout its length, independently of the outer shape of the outer sleeve.

3. A heating system as claimed in claim 1 or 2, characterised in that the throttling means (5) is mounted on the element side of a control valve (4; 9) associated with said element.

4. A heating system as claimed in any one of claims 1—3, characterised in that the outer sleeve (10) is made of rubber.

5. A heating system as claimed in any one of claims 1—4, characterised in that the inner sleeve (11) is made of brass and has a precision-drilled hole (14).

6. A heating system as claimed in any one of claims 1—5, characterised in that the inner sleeve (11) is cylindrical and has at one end a flange (13) for engaging one end surface of the outer sleeve (10).

7. A heating system as claimed in any one of claims 1—6, characterised in that the outer sleeve (10) has an end flange (12).

8. A heating system as claimed in any one of claims 1—7, characterised in that the throttling means (5) is mounted in the supply conduit (2; 7) to the element (1; 6).

Patentansprüche

1. Heizungssystem für Wohnhäuser, bei dem der Wärmeträger Wasser ist, umfassend zumindest einen Zirkulationskreis mit mehreren Elementen (1; 6), die je zwei Anschlussleitungen (2, 3; 7, 8) aufweisen, die aus einer mit einer Hauptleitung verbundenen Zulaufleitung (2; 7) bzw. einer Rücklaufleitung (3; 8) bestehen, dadurch gekennzeichnet, dass jedes Element (1, 6) in einer der genannten Anschlussleitungen (2, 3; 7, 8) einen Kupplungsteil und ein festes, hauptsächlich den gesamten Druckfall des Zirkulationskreises aufnehmendes Drosselglied (5) aufweist, das im Kupplungsteil verdeckt, montiert ist und eine Aussenhülse (10) aus nachgiebigem Werkstoff und von einer der Innenform des Kupplungsteils entsprechenden Aussenform sowie eine starre Innenhülse (11) umfasst, die in einem durchgehenden Kanal in der genannten Aussenhülse (10) untergebracht ist, die eine schalldämpfende Aufhängung für die Innenhülse und eine Dichtung zwischen dieser und dem Kupplungsteil bildet, und dass die Innenhülse ein zentrales Loch einer genau festgelegten Querschnittsfläche aufweist, deren Wert aus einer Gruppe von vorbestimmten Werten gewählt ist, um einen k_v-Wert im Bereich 0,02—3,00 zu erhalten.

2. Heizungssystem nach Anspruch 1, dadurch gekennzeichnet, dass der durchgehende Kanal der Aussenhülse (10) in seiner gesamten Länge dieselbe Querschnitssform aufweist, unabhängig von der Aussenform der Aussenhülse.

3. Heizungssystem nach Anspruch 1 oder 2, dadurch gekennzeichnet, dass das Drosselglied (5) auf der Element-Seite eines mit dem Element verbundenen Steuerventils (4; 9) montiert ist.

4. Heizungssystem nach einem der Ansprüche 1—3, dadurch gekennzeichnet, dass die Aussenhülse (10) aus Gummi gefertigt ist.

5. Heizungssystem nach einem der Ansprüche 1—4, dadurch gekennzeichnet, dass die Innenhülse (11) aus Messing gefertigt ist und ein auf genaues Mass gebohrtes Loch (14) aufweist.

6. Heizungssystem nach einem der Ansprüche 1—5, dadurch gekennzeichnet, dass die Innenhülse (11) zylindrisch ist und am einen Ende einen Flansch (13) zur Anlage gegen die eine Stirnfläche der Aussenhülse (10) hat.

7. Heizungssystem nach einem der Ansprüche 1—6, dadurch gekennzeichnet, dass die Aussenhülse (10) einen Endflansch (12) hat.

8. Heizungssystem nach einem der Ansprüche 1—7, dadurch gekennzeichnet, dass das Drosselglied (5) in der Zulaufleitung (2; 7) zum Element (1; 6) montiert ist.

Revendications

1. Système de chauffage domestique dans lequel le fluide caloporteur est de l'eau, ledit système comportant au moins un circuit de circulation avec une pluralité d'éléments (1; 6) présentant chacun deux conduites de liaison (2, 3; 7, 8) qui sont respectivement une conduite d'alimentation (2; 7) reliée à la conduite principale, et une conduite de retour (3; 8), caractérisé en ce que chaque élément (1; 6) comporte, sur l'une desdites conduites de liaison (2, 3; 7, 8), un raccord et un moyen d'étranglement fixe (5) qui absorbe sensiblement toute chute de pression dans le circuit de circulation, ledit moyen d'étranglement étant monté en position cachée dans ledit raccord et comportant une douille extérieure (10) en matériau souple et d'une forme

extérieure correspondant à la forme intérieure dudit raccord, ainsi qu'une douille intérieure rigide (11) portée dans un passage traversant, dans ladite douille extérieure (10), qui réalise une suspension accoustique pour la douille intérieure et une étanchéité entre ladite douille intérieure et ledit raccord; et en ce que ladite douille intérieure présente un trou central d'une surface de section droite exactement définie, d'une valeur choisie parmi un groupe de valeurs prédéterminées pour obtenir une valeur k_v sur la plage 0.02—3.00.

2. Système de chauffage selon la revendication 1, caractérisé en ce que le passage traversant de la douille extérieure (10) présente la même forme de section droite sur toute sa longueur, indépendamment de la forme extérieure de la douille extérieure.

3. Système de chauffage comme revendiqué dans la revendication 2, caractérisé en ce que le moyen d'étranglement (5) est monté sur l'élément à côté d'un robinet de commande (4, 9) associé audit élément.

4. Système de chauffage selon l'une quelconque des revendications 1—3, caractérisé en ce que la douille extérieure (10) est en caoutchouc.

5. Système de chauffage selon l'une quelconque des revendications 1—4, caractérisé en ce que la douille intérieure (11) est en laiton et présente un trou percé avec précision (14).

6. Système de chauffage selon l'une quelconque des revendications 1—5, caractérisé en ce que la douille intérieure (11) est cylindrique et présente à l'une de ses extrémités un flasque (13) pour venir en contact avec l'une des surfaces d'extrémité de la douille extérieure (10).

7. Système de chauffage selon l'une quelconque des revendications 1—6, caractérisé en ce que la douille extérieure (10) présente un flasque d'extrémité (12).

8. Système de chauffage selon l'une quelconque des revendications 1—7, caractérisé en ce que le moyen d'étranglement (5) est monté sur la conduite d'alimentation (2; 7) qui rejoint l'élément (1; 6).

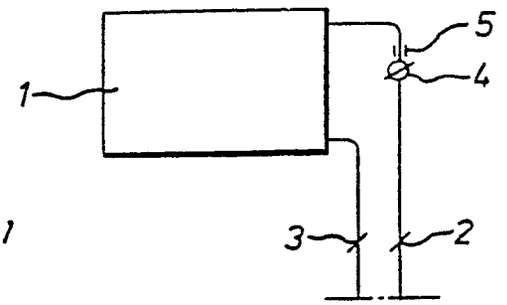

Fig.1

Fig.2

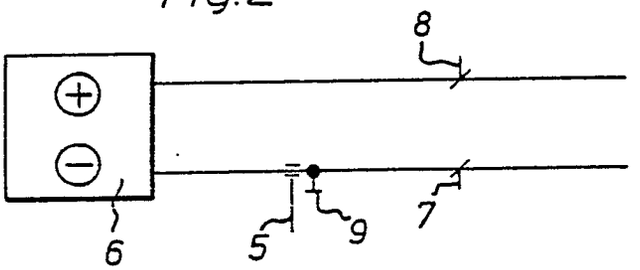

Fig.3

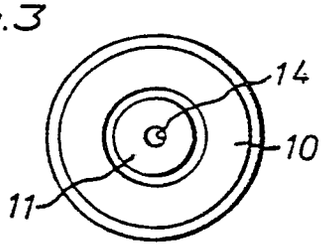

Fig.4

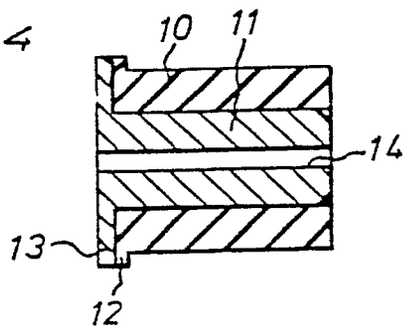

Fig.5

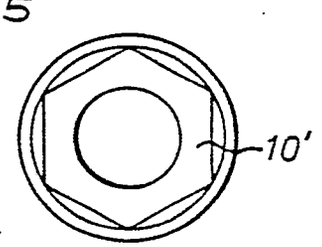

Fig.6