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(54) A device for a water heater

(57) The invention concerns a device for a water heater consisting of an insulated accumulation storage tank (1) together with a through-flow device (2), wherein the through-flow device (2) in the bottom area (cold water intake) (7) of the storage tank (1) and the top area (hot water outlet) (8), are connected by pipes (4,11). The pipe is provided with a temperature-controlled flow/choke valve (3) which by means of a heat-sensitive element monitors the desired temperature in the pipe (4), which valve (3) is provided after a heating element, viewed in the direction of flow.

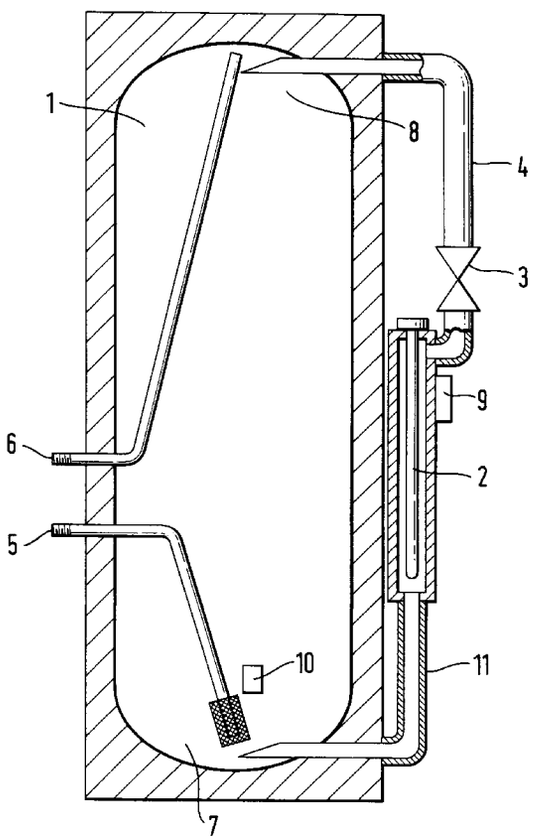

Fig. 1

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The following invention concerns a device for a water heater consisting of an insulated accumulation storage tank together with a through-flow device, wherein the through-flow device in the bottom area (the cold water intake) of the storage tank and the top area (the hot water output), are connected by pipes.

In SE laid open patent application 344 631 there is further disclosed a device which controls an electric element's energy output based on the temperature in an external circulation pipe provided between the cold water intake (the bottom area) and the hot water intake (the top area). The temperature is controlled by means of a thermostat which governs a control device consisting of one or more thyristors which can connect full or partial power from an electrical energy source.

In water heaters the use is also known of choke valves which reduce the through- flow of water mechanically without any kind of thermal control regulating the volume of water.

One requirement therefore is to provide a device for water heaters which can accumulate hot water at a constant temperature, e.g. 70°C, independently of the energy supplied as well as to concentrate the energy supplied in order to reduce the accumulation time for consumer hot water.

A further requirement of the invention is that hot water, which has lower density than cold water and which is added at the top of the water storage tank, should mix to as little an extent as possible with the cold water in the bottom of the storage tank.

Thus the object of the present invention is to provide a device for water heaters which satisfies these requirements.

This object is achieved with a device according to the type mentioned in the introduction, which is characterized by the features indicated in the attached claims.

By means of the invention there is obtained by simple means a device for water heaters which governs the through-flow of water with temperature monitoring, and the aim of which is to maintain a constant temperature independently of the energy supplied, i.e. the increase in temperature multiplied by the volume of water is kept constant by variation of the water volume.

The result of the design according to the present invention is that the hot water which is supplied to the top area of the water storage tank does not mix with the cold water, but remains lying in thin layers with a slowly sinking temperature gradient and without mixing to any noticeable extent with the cold water.

The invention will now be described in more detail by means of non-limiting embodiments which are illustrated on the single figure, which is a cross section of the device.

Figure 1 shows a device which consists of an insulated accumulation storage tank 1, a through-flow device 2 and a temperature-sensitive element 3, which expands under the influence of heat, and where these are connected by pipes 4, 11.

The storage tank 1 is supplied with cold water through an inlet pipe 5 and supplies hot water through an outlet pipe 6. The accumulation of hot water is provided by means of a through-flow device 2, which is provided between the storage tank's 1 bottom area 7 (cold water intake) and the temperature-sensitive element 3, which is connected to the top area 8 (hot water outlet) of the storage tank 1.

The through-flow device 2 is supplied with a heating element (not shown), e.g. an electric element, which is thermostatically controlled by means of a thermostat 9 and equipped with an overheating control in the form of a further thermostat 10.

The energy which is supplied to the water heater is constant, i.e. the water temperature which leaves the through-flow device 2 is not controlled by means of the electric element, but by the actual flow of water through the temperature-sensitive element 3.

The temperature-sensitive element 3 is opened when the water temperature downstream of the element 3 agrees with the preset temperature and closes when the temperature falls below the preset temperature. When the water temperature exceeds the preset temperature, a piston (not shown) inside the element 3 is fully opened, thus increasing the through-flow of water and thereby mixing it with colder water. The device is arranged in such a manner that it never closes completely, but permits a certain amount of water to flow through, in order, amongst other things, to drain off expanded water.

The temperature-sensitive element 3, which is provided after the through-flow device, viewed in the direction of flow, consequently monitors the accumulation temperature of the water flowing into the upper part of the storage tank. The accumulation of hot water continues for as long as the water in the bottom of the storage tank is colder than the preset temperature, the process being stopped thereafter by the element's working thermostat (not shown), which is located in the lower part of the storage tank.

If, e.g., the through-flow device 2 is provided with a 3 kW element, the water heater according to the invention will have accumulated after approximately 50 minutes 33 litres of 70°C water, which is sufficient hot water for a shower (60 litres at 40°C) as opposed to known water heaters which take up to 7 hours to accumulated hot water at 70°C.

Figure 2 shows the progress of heating from 5°C to 70°C for a 200 (194) litre water heater, in the form of time consumption and number of litres accumulated of hot water at 70°C.

Claims

1. A device for a water heater consisting of an insulated accumulation storage tank (1) together with a through-flow device (2), wherein the through-flow device (2) in the bottom area (cold water intake) of the storage tank (1) and the top area (hot water outlet) (8), are connected by pipes (4,11), characterized in that the pipe is supplied with a temperature-controlled flow/choke valve (3) which by means of a heat-sensitive element monitors the desired temperature in the pipe (4), which valve (3) is provided after a heating element, viewed in the direction of flow.

2. A water heater according to claim 1, characterized in that the heating element is an electric element which is thermostatically controlled by a thermostat (9) and equipped with overheating control in the form of a further thermostat (10).

3. A water heater according to claims 1 and 2, characterized in that the through-flow device (1) is equipped with a heat exchanger which is connected to hot gas from a heat pump or water-borne energy from one or more energy sources or steam.

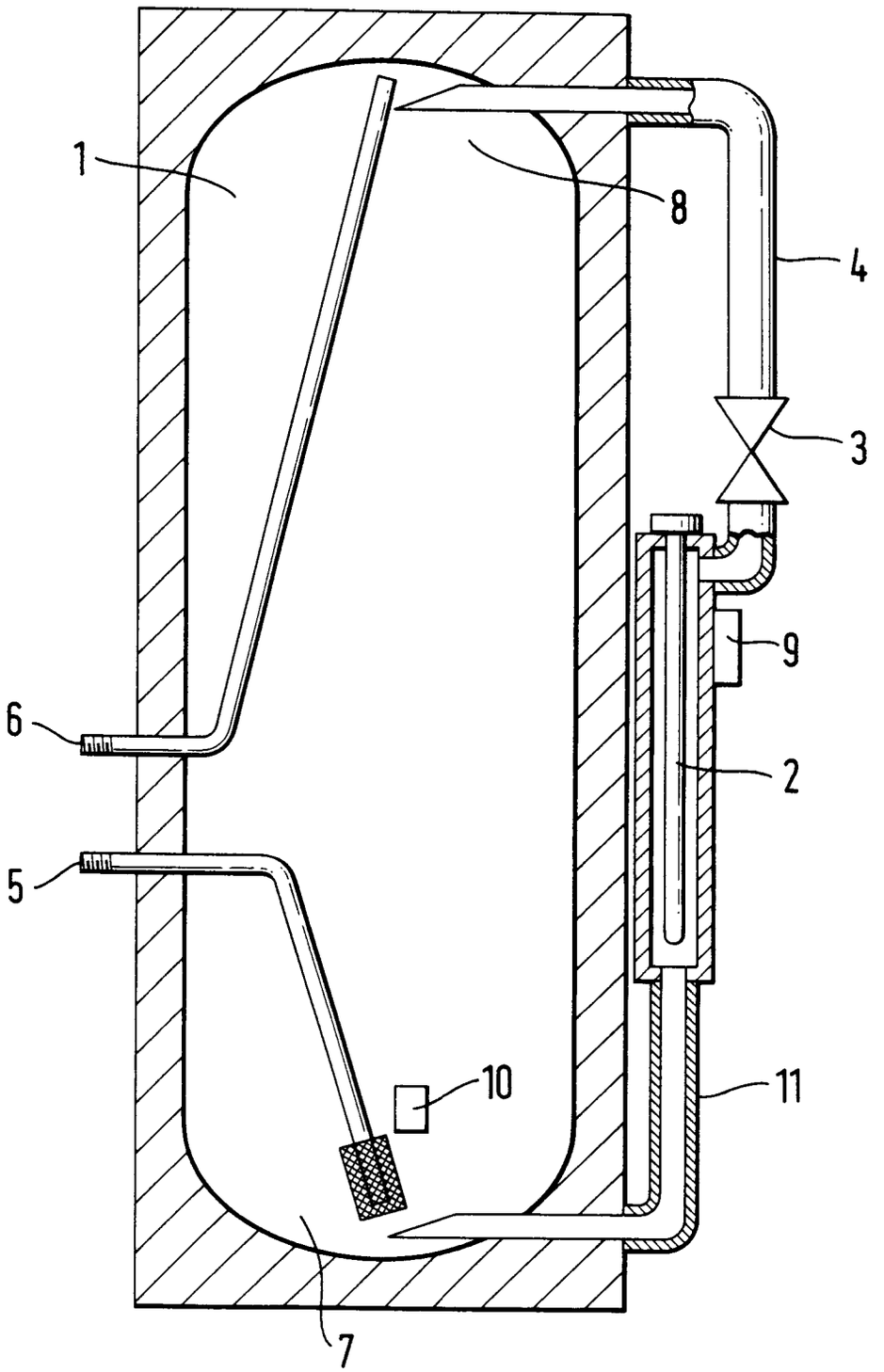

Fig. 1

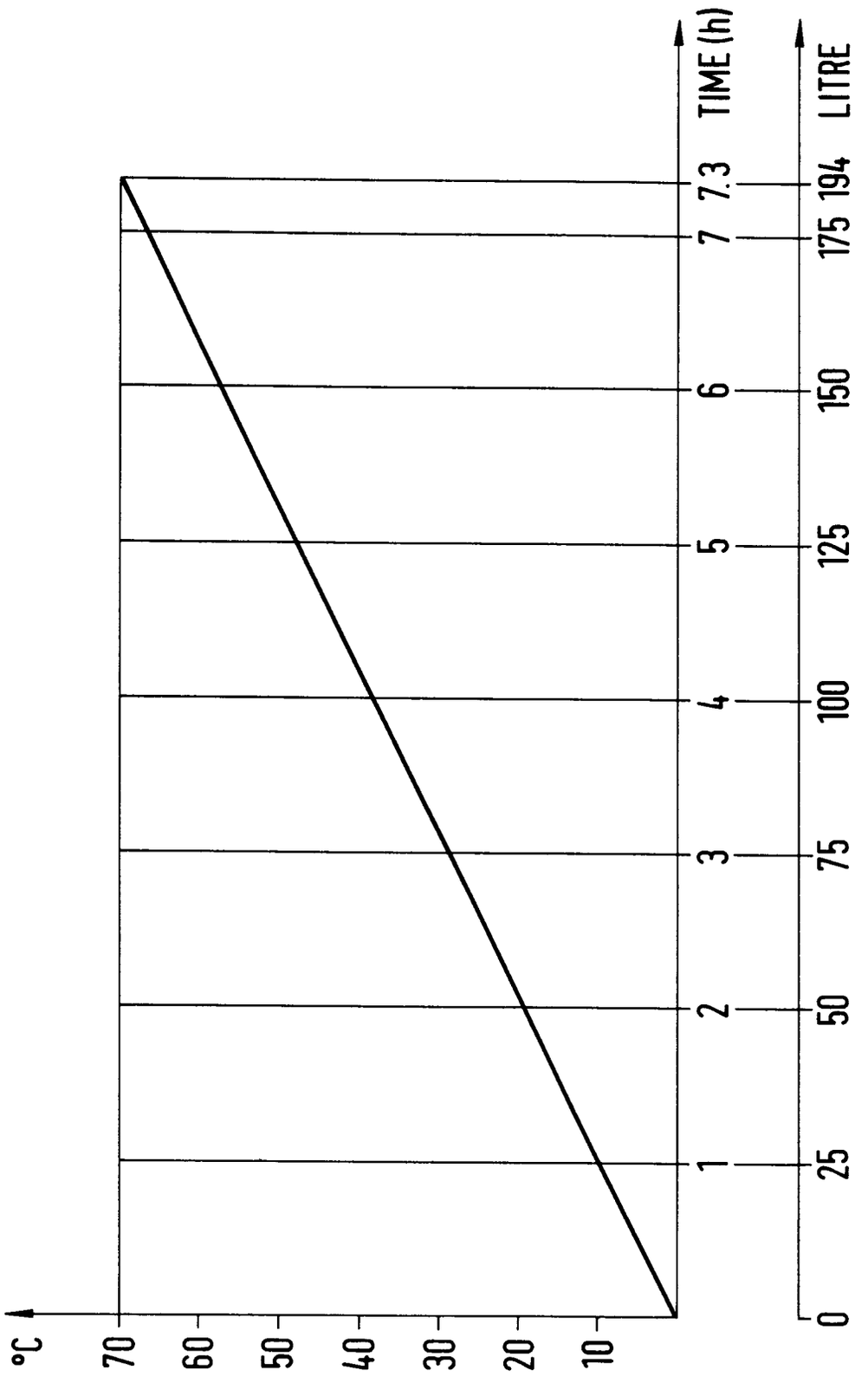
°C
70
60
50
40
30
20
10
TIME (h)
1
2
3
4
5
6
7
7.3
LITRE
0
25
50
75
100
125
150
175
194

Fig. 2

European Patent Office

EUROPEAN SEARCH REPORT

Application Number EP 95850104.1

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.6)
D,A	SE - A - 344 631 (AB THERMIA-VERKEN) * Totality * --	1	F 24 H 9/20 F 24 H 1/18
X	EP - A - 0 309 199 (CHUBU ELECTRIC POWER COMPANY INC.) * Totality * --	1,2	
X	AT - B - 397 144 (HEIZBETRIEBE WIEN GES.M.B.H.) * Totality * ----	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.6)

F 24 H 1/00
F 24 H 9/00

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	04-09-1995	ENDLER

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
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& : member of the same patent family, corresponding document

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