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(54) **Instant electric water heater**

Elektrischer Durchlauferhitzer

Chauffe-eau instantané

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## Description

### OBJECT OF THE INVENTION

[0001] The object of the invention consists in an instant electric water heater, of reduced dimensions, for both domestic and industrial use, maximally optimizing its yield with a minimum energy consumption and continuous hot water flow, without temperature or flow losses occurring.

### BACKGROUND OF THE INVENTION

[0002] Electric water heaters usually contain a large volume of water which must remain enclosed, ready for use, in a relatively isolated vessel, with the subsequent expense for maintaining the temperature of that large water mass.

[0003] Furthermore, once hot water consumption has begun, the hot water is limited over time, since once the hot water stored in the vessel is consumed, the heater is not able to heat water at the rhythm of consumption, therefore the water temperature abruptly drops, with the corresponding inconveniences and discomforts.

[0004] These electric heaters take a fairly long time from when they are connected until they are able to supply hot water at a certain temperature.

[0005] Conventional heaters have a large volume, often difficult to hide or conceal with the furniture, and are therefore difficult to install in a special area.

[0006] Other kind of electric heater is disclosed in the patents US-2.987.605-A and US-6.198.879-B1.

[0007] The object of the invention of the patent US-2.987.605-A consists in a heater especially adapted for heavy fuel oils for the burners of heating plants.

[0008] The heater disclosed in the patent US-2.987.605 A, as well as the one of the present application, has a sealed and pressurized vessel, which houses, submerged in a heat-transfer fluid, an electric group surrounded by a single coil that has an inlet for the fluid to be heated and an outlet to an external vessel surrounding the internal vessel. The external vessel has an outlet for the heated fluid. There is a temperature control device on the bottom of the heater of the patent US-2.987.605-A.

[0009] The object of the invention of the patent US-6.198.879-B1 consists in a sensor block and automatic fill valve for water heater for domestic use that consists in a single pressureless vessel, which houses a copper coil which carries the water to be heated as well. On the other hand, the heater of the present application has a second sealed external vessel of reduced dimensions to prevent thermal inertia, and where both water outlets of the coils are mixed as it is described in the following paragraphs.

### DESCRIPTION OF THE INVENTION

[0010] The present invention is an instant water heater

of continuous cyclic rate and reduced dimensions, it is very useful for preventing the previous drawbacks and for replacing large boilers, normally gas and potentially dangerous boilers, supplying hot water for consumption, and at the same time, acting as a hot water supply for heating units.

[0011] The heating of the water is carried out by means of an electric heater group with a fork shape or the like, submerged in a heat-transfer oil, or a similar fluid, which is kept hot and at a constant temperature due to the effect of the heater, this heat-transfer oil being of a minimum volume. The water to be heated circulates through two shunted coils surrounding the heater group, also being submerged in the heat-transfer oil. This heater-coil-heat transfer oil assembly is housed in a suitably sealed and pressurized internal vessel.

[0012] To maintain water flow and to minimize pressure and flow losses, the two shunted coils are provided with a single common external water inlet, whereas the outlet of each coil is independent, which outlet is arranged outside the internal vessel, on which a second vessel, also sealed and of reduced dimensions to prevent thermal inertia, has been installed; both water outlets of the coils are mixed in this external vessel and are homogenized until their outlet, as hot water, through a hole made in the external vessel.

[0013] A hollow bushing incorporating a stopper and which keeps the two vessels equidistant passes through the two vessels, at the same time allowing the filing of the heat-transfer oil and pressurizing of the internal vessel.

[0014] The hot water outlet of the external vessel, together with a direct cold water inlet like the one entering the heater to the coils, are collected by a thermostatic valve, which regulates the final water outlet temperature, thus always keeping it uniform.

[0015] The outlet of this thermostatic valve is connected in tandem to a pressure switch which, taking the temperature data collected by a probe installed inside the internal vessel as a reference, will provide the corresponding connection or disconnection instructions to the heater group.

[0016] An insulating layer surrounding the external vessel has been arranged to prevent the system from losing heat to the outside.

[0017] All this is proposed to be manufactured in a reduced and compact shape.

### BRIEF DESCRIPTION OF THE DRAWINGS

[0018] The following figures are included to facilitate understanding of the invention:

- Figure 1 shows an exploded perspective view of the main components of the electric water heater.
- Figure 2 shows an upper view of the heater according to a section thereof along the horizontal plane containing the axis of the internal and external vessels

of the heater.

## PREFERRED EMBODIMENT OF THE INVENTION

[0019] A preferred embodiment of the invention, which is to be understood in a broad and non-limiting sense, is detailed below.

[0020] Figure 1 shows the most important components of the instant electric water heater: an external vessel (1), an internal vessel (2) housing a heater group (3) surrounded by two shunted coils (4, 5), an external water inlet (6) common to both coils reaching them and passing through the walls of both vessels (1, 2). The external vessel (1) is provided with a hot water outlet (7) connected, together with a cold water conduit (19), to a thermostat (14) in tandem with a pressure switch (15) connected to a probe (16) measuring the temperature of the heat-transfer oil of the internal vessel (1).

[0021] Figure 2 shows the circulation of water in the heater. The water to be heated circulates through two coils (4, 5) surrounding an electric heater group (3) of those having a fork shape or the like. Both the electric heater group (3) and the coils (4, 5) surrounding it are submerged in a heat-transfer oil or similar fluid which is kept hot and at a constant temperature due to the action of the electric heater group (3), this fluid being of a minimum volume; all this housed in a suitably sealed and pressurized internal vessel (2).

[0022] A temperature measuring probe (16) is installed in the internal vessel (2) to control the temperature of the heat-transfer oil.

[0023] The two coils (4, 5) are arranged in shunt with a single external cold water inlet (6), which is shared between the two coils, and two independent water outlets (20); this allowing minimization of losses of pressure and flow to the outside of the internal vessel (2). The internal vessel (2) is surrounded by a sealed external vessel (1) of reduced dimensions to prevent thermal inertia, and it is where the two exiting water flows of the internal vessel are mixed and homogenized, and where the water continues to be heated since it is in contact with the walls of the internal vessel (2), which is hot because it contains the heat-transfer fluid heated by the heater group (3).

[0024] The external vessel (1) is provided with a hole with a water outlet (7) through which the heated water is evacuated.

[0025] The cold water inlet (13) going into the heater splits into two channels, the first channel is the water inlet (6) to the coils (4, 5) and the second channel is a conduit (19), the opposite end of which ends, together with the hot water outlet (7) of the external vessel (1), in a thermostatic valve (14), where both hot and cold water currents are mixed, and where the temperature of the outlet water is finally regulated, thus always keeping it at a uniform temperature.

[0026] The thermostatic valve (14) outlet is connected in tandem with a pressure switch (15) which is connected to the probe (16) for measuring the temperature of the

heat-transfer oil of the internal vessel (2). The pressure switch (15) will connect or disconnect the heater group (3) according to the data of the heat-transfer oil temperature collected by the probe (16).

[0027] After passing through the pressure switch, the suitably heated water passes to the network or is directly used.

[0028] A hollow bushing (8) incorporating a stopper (9) passes through the two external (1) and internal (2) vessels, and keeps the two vessels (1, 2) equidistant, at the same time allowing the filling of fluid and pressurizing of the internal vessel (2).

[0029] The two vessels (1, 2) share a common base (17) which the support base (18) of the heater group (3) is coupled to by means of nuts (11) and screws (10).

[0030] An insulating layer (12) surrounding the external vessel has been arranged to prevent the assembly from losing heat to the exterior.

## Claims

1. An instant electric water heater, or the kind that has a sealed and pressurized internal vessel (2) which houses, submerged in a heat-transfer fluid, an electric heater group (3), surrounded by two shunted coils (4, 5), said coils having an inlet (6) for the fluid to be heated and each coil having an outlet (20) to the outside of the internal vessel, the internal vessel (2) being completely surrounded, sharing a single base (18) or another connection element, by a sealed external vessel (1) provided with a heated water outlet (7) wherein said inlet (6) is shared by the two shunted coils (4,5), the heated water outlet (7) ends in a thermostatic valve (14) together with the end of an external cold water conduit (19) and the outlet of the thermostatic valve (14) is connected in tandem with a pressure switch (15) connected to a temperature probe (16) housed in the internal vessel (2).
2. An instant electric water heater according to claim 1, **characterized in that** the electric heater group (3) is of those having a fork shape.
3. An instant electric water heater according to previous claims, **characterized in that** the cold water inlet (6) to the coils (4, 5), and the cold water channel (19) to the thermostatic valve (14) are the two bifurcations of a single external cold water inlet (13).
4. An instant electric water heater according to previous claims, **characterized in that** the external (1) and internal (2) vessels are equidistant and a hollow bushing (8) incorporating a stopper (9) passes through them.
5. An instant electric water heater according to previous

claims, **characterized in that** the external vessel (1) is surrounded by an insulating layer (12).

## Patentansprüche

1. Elektro-Durchflussheizkessel von der Art, dass er einen abgedichteten und druckdichten inneren Behälter (2) hat, welcher unter einem Wärmeträgermedium eine von zwei abgeleiteten Spulen (4, 5) umgebene elektrische Heizgruppe (3) aufnimmt, wobei die besagten Spulen einen Eingang (6) für die zu erwärmende Flüssigkeit haben und jede Spule einen Ausgang (20) zum Äußeren des inneren Behälters hat, wobei der innere Behälter (2) mit einem einzigen gemeinsamen Boden (18) oder ein anderes Verbindungselement von einem mit einem erwärmten Wasserausgang (7) versehenen abgedichteten äußeren Behälter (1) vollständig umgeben ist, in welchem der genannte Eingang (6) von den beiden abgeleiteten Spulen (4, 5) geteilt wird, und der erwärmte Wasserausgang (7) zusammen mit dem Ende einer äußeren Kaltwasserleitung (19) in einem thermostatischen Ventil (14) endet, und der Ausgang des thermostatischen Ventils (14) mit einem Druckschalter (15), der an einen im inneren Behälter (2) aufgenommenen Wärmefühler (16) angeschlossen ist, in Serie geschaltet ist.
2. Elektro-Durchflussheizkessel nach Anspruch 1, **dadurch gekennzeichnet, dass** die elektrische Heizgruppe (3) von denjenigen ist, welche Gabelform haben.
3. Elektro-Durchflussheizkessel nach den vorangehenden Ansprüchen, **dadurch gekennzeichnet, dass** der Kaltwassereingang (6) zu den Spulen (4, 5) und der Kaltwasserkanal (19) zum thermostatischen Ventil (14) die beiden Gabelungen eines einzigen äußeren Kaltwassereingangs (13) sind.
4. Elektro-Durchflussheizkessel nach den vorangehenden Ansprüchen, **dadurch gekennzeichnet, dass** die äußeren (1) und inneren (2) Behälter abstandsgetreu sind und eine einen Verschluss (9) eingliedernde Hohlbohrung (8) durch diese hindurchgeht.
5. Elektro-Durchflussheizkessel nach den vorangehenden Ansprüchen, **dadurch gekennzeichnet, dass** der äußere Behälter (1) von einer Isolierschicht (12) umgeben ist.

## Revendications

1. Un chauffe-eau électrique instantané, du type ayant un récipient (2) interne pressurisé et étanche qui lo-

ge, submergé dans un fluide caloporteur, un groupe (3) réchauffeur électrique, entouré par deux serpentins (4, 5) de dérivation, lesdites serpentins ayant une entrée (6) pour le fluide à chauffer et chaque serpentins ayant une sortie (20) à la sortie du récipient interne, le récipient (2) interne étant complètement entouré, partageant une base (18) unique ou un autre élément de connexion, par un récipient (1) externe étanche pourvu d'une sortie (7) d'eau réchauffée dans lequel, ladite entrée (6) est partagée par les deux serpentins (4,5) de dérivation, et la sortie (7) d'eau réchauffée se termine dans une valve (14) thermostatique conjointement avec l'extrémité d'un conduit (19) externe d'eau froide et la sortie de la valve (14) thermostatique est connectée en tandem avec un pressostat (15) connecté à une sonde (16) de température logée dans le récipient (2) interne.

2. Un chauffe-eau électrique instantané selon la revendication 1, **caractérisé en ce que** le groupe (3) réchauffeur électrique est du type ayant une forme de fourche.
3. Un chauffe-eau électrique instantané selon les revendications antérieures, **caractérisé en ce que** l'entrée (6) d'eau froide aux serpentins (4, 5), et le canal (19) d'eau froide à la valve (14) thermostatique sont les deux bifurcations d'une seule entrée (13) externe d'eau froide.
4. Un chauffe-eau électrique instantané selon les revendications antérieures, **caractérisé en ce que** les récipients externe (1) et interne (2) sont équidistants et un manchon (8) creux incorporant un bouchon (9) passe à travers eux.
5. Un chauffe-eau électrique instantané selon les revendications antérieures, **caractérisé en ce que** le récipient (1) externe est entouré par une couche (12) isolante.

FIG. 1

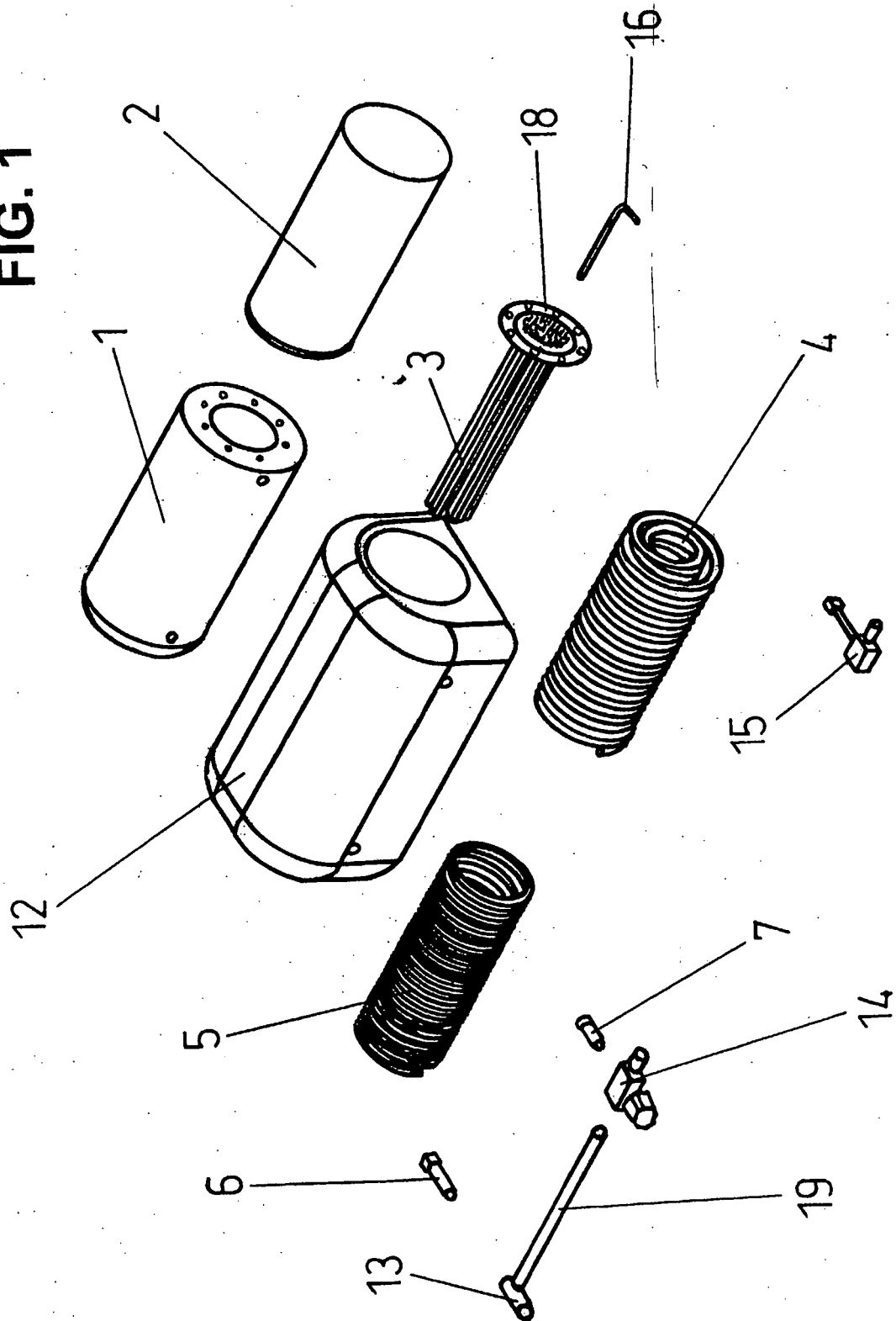
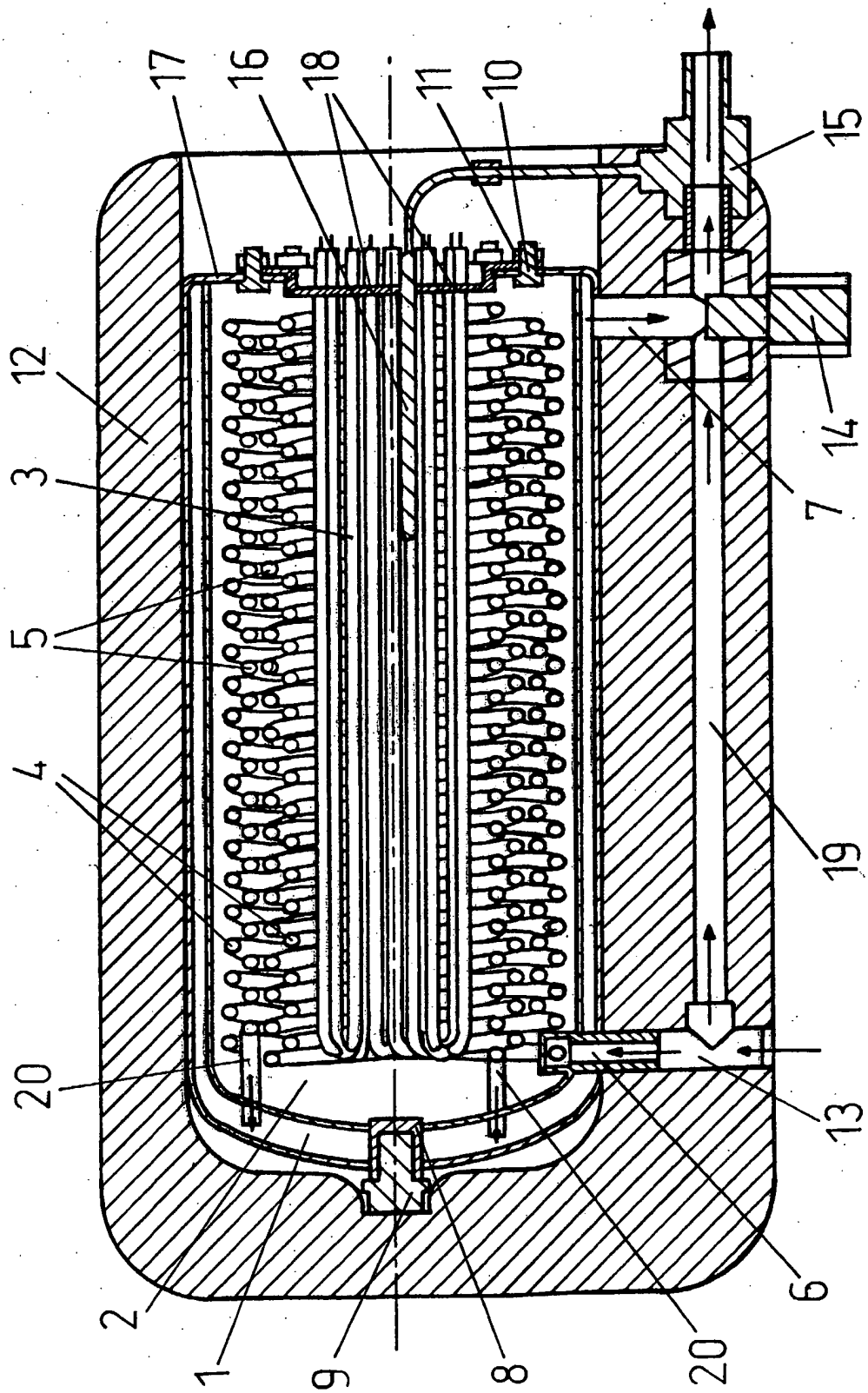


FIG. 2



**REFERENCES CITED IN THE DESCRIPTION**

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