

12

EUROPEAN PATENT APPLICATION

21 Application number: 84201494.6

51 Int. Cl.⁴: F 24 H 1/22

22 Date of filing: 15.10.84

43 Date of publication of application:
23.04.86 Bulletin 86/17

84 Designated Contracting States:
BE DE FR GB IT NL

71 Applicant: **Plaatverwerkende Industrie van Wijk en Boerma B.V.**
Zuidlaarderweg 12
NL-9482 TW Tynaarlo, Gem. Vries(NL)

72 Inventor: **Zijlstra, Egbert**
p/a Zuidlaarderweg 12
NL-9482 TW Tynaarlo(NL)

74 Representative: **den Boer, Jan Johannes, Ir. et al,**
Octrooibureau Polak & Charlois Laan Copes van
Cattenburch 80
NL-2585 GD The Hague(NL)

54 Water heating appliance e.g. a domestic boiler.

57 The water heating appliance of the invention has a vertical container which may be connected to a central heating boiler (12) and has in its interior a sleeve (27) with closed bottom (28) and open top, a tap water coil (7) being provided between the container wall and the sleeve. Thereby colder water from the boiler (12) is entered through the sleeve bottom (28) and the coil (7) is always in contact with the hottest water, so that the tap water temperature is kept better constant.

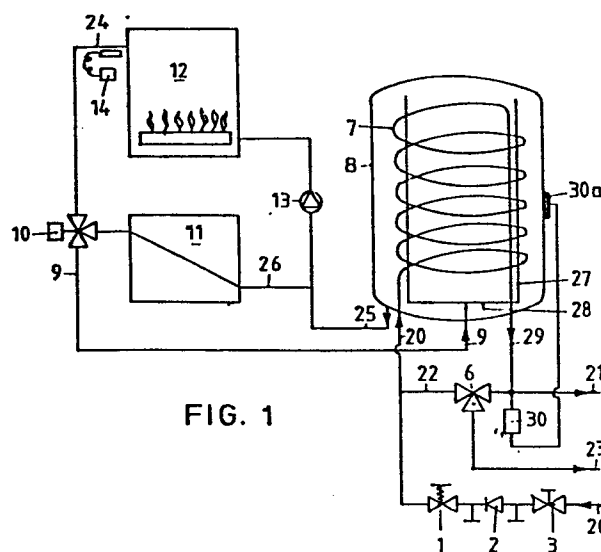


FIG. 1

Title: Water heating appliance, e.g. a domestic boiler.

The invention relates to a water heating appliance, comprising a vertical container, which is connected in the circuit of a central heating boiler, a heating coil being provided within the container for tapping hot water, one end of said coil being connected to a water mains, said coil being provided adjacent to the container wall.

A similar appliance is known from NL-A-8300867. In that the container is filled with boiler water (temperature 75 - 80°C) and has a substantial capacity (e.g. 40 liters), this appliance permits tapping hot water at constant temperature (e.g. 45°C) during a long period, via an automatic mixing device. Said period of course depends on the quantity of water which is tapped per unity of time.

It has now appeared that the tap water temperature may be maintained still better constant if care is taken that the water in the container having the highest temperature is always directly adjacent to the coil. For it is that the water temperature in the container is only at the same value all over the container in a condition of equilibrium, if for considerable time no water has been tapped. In summer the central heating boiler is not operative for heating radiators and therefore, if heat supply to the water boiler is necessary, initially colder water will be supplied thereto by the central heating boiler than the water already present in the container. It must be avoided that this water directly contacts the coil.

This is achieved according to the invention in that a sleeve with open top end is provided within the container, parallel to the vertical container wall, at the other side of the coil than the container wall, said sleeve extending up to close to the upper side of the container and is closed at the under side, the central heating boiler water supply conduit opening through the closed under-side within the sleeve in the container, the central heating boiler discharge conduit being connected to the container bottom.

Thereby a constrained circulation is obtained through the

container within the sleeve upwardly and on the outside of
the sleeve downwardly, the supplied central heating boiler
water becoming sufficiently mixed with the container contents
before the water reaches the coil. Moreover, the space containing
5 the coil is strongly reduced by the sleeve and the container wall
relative to the remainder of the container, whereby the circulation
velocity along the coil and thereby the heat transmission increases.

The invention is specially of importance by the tendency
of the later years to reduce the boiler capacity of a central heating
10 installation for houses. This has been reduced e.g. from 20 to 5 kw
in connection with the smaller heat requirement as a result of
better isolation of the houses. Thereby it takes longer before,
after a period in which the burners have not been operative, the
central heating boiler water is again at normal temperature.

15 Preferably in known manner the direction of movement of
heated and heating water must be contrary. Thereto the appliance is
constructed such that the inlet end and the outlet end of the
coil are provided at the under side of the container.

The invention will be further explained below with
20 reference to the drawing, showing an embodiment, given as an example,
of the appliance according to the invention.

Fig. 1 shows schematically the water circuit of the
hot water appliance connected to a central heating boiler.

Fig. 2 is a schematic longitudinal section through
25 the appliance, having supply and discharge points for the water.

The circuit as shown in figure 1 comprises a cold water
supply line 20, e.g. connected to a water mains, said line having
a control valve 1, a check valve 2 and a stop valve 3 and leading
to the appliance, e.g. a domestic boiler, said line being connected
30 to the heat exchanger as formed by a coil 7 of said appliance, the
water reservoir or container of which bears the reference number 8.
The coil leaves the container at its under side and is connected
to a line 21 which is also connected to the output of an automatic
mixing valve or automatic mixing device 6, the input of which is
35 connected by a conduit 22 to the cold water supply line 20. The line 21

constitutes the tap line of the appliance.

The automatic mixing device 6 also has a hot water output connected to a conduit 23, from which hot tap water may be obtained from the appliance, e.g. water which is not mixed with cold water.

The supply of hot central heating boiler water to the container 8 of the appliance is obtained with a conduit 9 extending through the under-wall of the container and opening into the bottom 28 of a sleeve 27, which has an open top. Said conduit 9 is connected through a three-way valve 10 and a conduit 24 to the output of the central heating boiler 12, while also radiators 11 are connected to said boiler through the conduit 24 and the three-way valve 10. The heating water in the container 8 leaves the container at the under side through a conduit 25, which opens in the container bottom in the area between the sleeve 27 and the wall of the container 8. Said conduit is connected through a pump 13 to the water input of the boiler 12. The return conduits 26 of the radiators 11 are likewise connected to the return line 25.

The primary or heating water leaving the boiler through the conduit 24 has a maximum temperature which is adjustable through the boiler thermostat 24 and said temperature e.g. has the value of 90°C . The temperature of the heating water in the container 8 is then e.g. $75 - 80^{\circ}\text{C}$.

The boiler container 8 is shown on an enlarged scale in figure 2 together with the different lines connected thereto. Within the container the sleeve 27 is provided, said sleeve having a bottom 28. In said bottom from the lower side of the boiler the central heating water supply line 9 opens. The coil 7 is provided, as seen in the radial direction, substantially half between the wall of the container 8 and the vertical wall of the sleeve 27. The cold water supply end of the coil enters, in the embodiment shown, the under side of the container 8. From the upper end of the coil 7 an end portion 29 extends within the sleeve 27 downwardly, passes in sealed manner through the bottom 28 thereof and subsequently passes the container bottom. The return line 25 between the container and the

boiler likewise leaves the container 4 at the under side.

In that the water supplied from the boiler to the container 8, which water may be colder than the water present in the container after an inoperative period, is entered through the bottom 28 of the sleeve 27, it does not contact the coil 7. A mixture with the water present in the container is generated. Because water is discharged from the container through line 25 outside the sleeve, the water within the sleeve slowly rises upwardly and subsequently moves downwardly between the sleeve and the container wall in contact with the coil 7. Then the water has reached at the upper end of the sleeve the average of the water temperature in the container. In that colder water is heavier than warmer water, also due to that fact warmer water will be present at the top of the container. The warmest water is concentrated by the sleeve on the coil, which improves the heat transmission thereto. The flow cross-section outside the sleeve is a couple of times smaller than that within the sleeve, whereby the flow velocity along the coil is proportionally increased.

In the embodiment shown in figure 2, moreover, the water in the coil moves in counterflow with that in the container outside the sleeve, whereby likewise the heat transmission efficiency is increased.

The temperature measuring element or sensor 30a of a thermostat 30 is provided substantially at half the height of the container 8 against its outer wall. It has appeared that this is the best position in order to keep the tap water temperature constant. Said thermostat is electrically connected to the central heating boiler.

If the heat energy taken by the supplied mains water from the heating water ^{is} equal to or greater than the energy supplied by the central heating boiler, that boiler remains continuously operative.

The new appliance may be connected to all existing and new central heating boilers, which are suitable for connection with a hot water storage reservoir.

The appliance according to the invention permits tapping

water having a constant temperature during a long period, during which the temperature differences are very small, smaller than 1°C . Due to the presence of the automatic mixing device the tap water temperature is not influenced by a somewhat higher or lower temperature of the primary heating water.

It is to be noted that when above a central heating boiler is mentioned, also a different heating source may be used. Particularly e.g. connection to a city heating system or to a heat pump may be practised, in which also the superheat of the compressed gasses in the primary circuit may be used for reaching a temperature of $70 - 75^{\circ}\text{C}$.

C L A I M S

1.Hot water appliance, comprising a vertical container
(8) connected in the circuit of a central heating boiler (12), a
coil (7) for tapping hot water being provided within the container
(8), one end of said coil being connected to a water mains (20) and
5 being provided adjacent to the container wall, characterized in that
a sleeve (27) with open top has been provided within the container
(8) parallel to the vertical container wall, at the other side of
the coil (7) than the container wall, said sleeve extending to
close to the container top and is closed at the under side by a bottom
10 (28), the central heating water supply conduit (9) opening through
said bottom within the sleeve (27) in the container (8), the
central heating water discharge conduit (25) being connected to the
container bottom.

2. Appliance according to claim 1, characterized in that the
15 inlet end and the outlet end of the coil (7) are provided at the
under-side of the container (8).

20

25

30

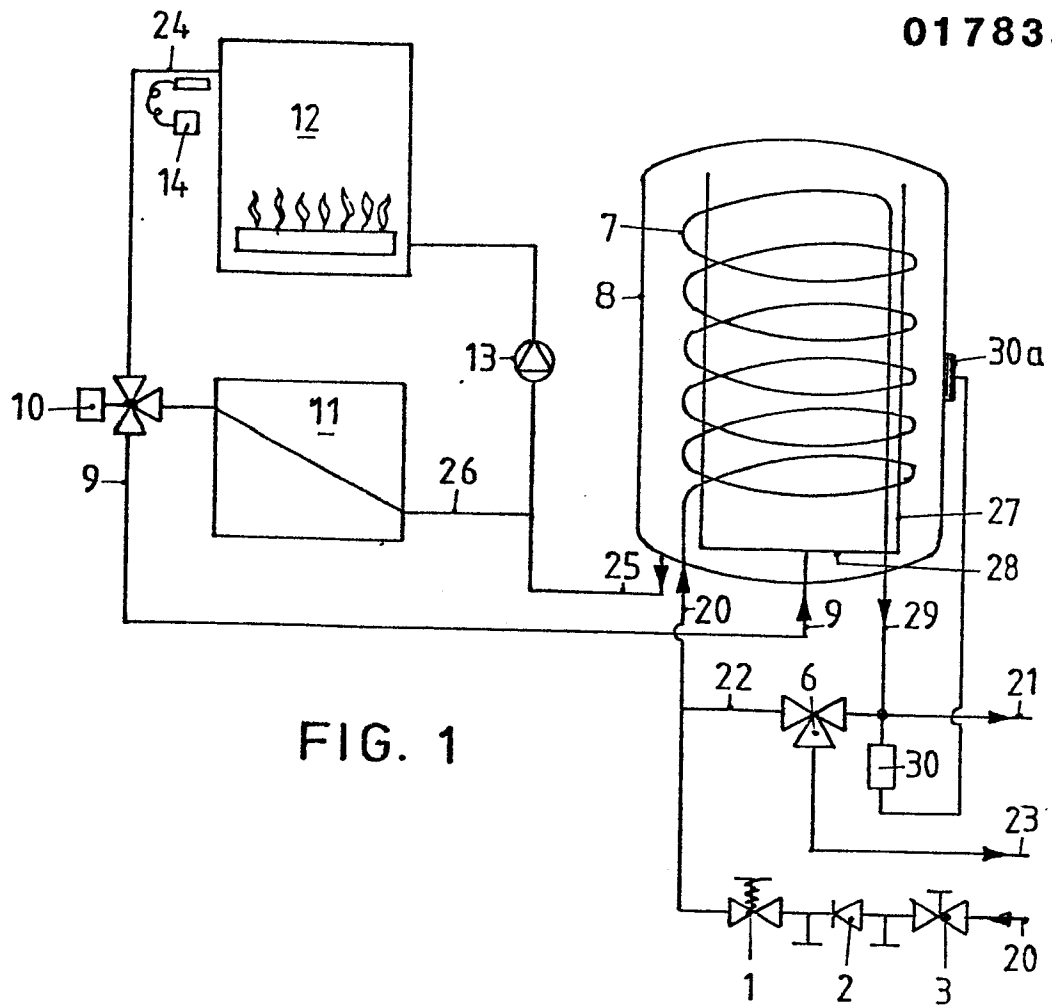


FIG. 1

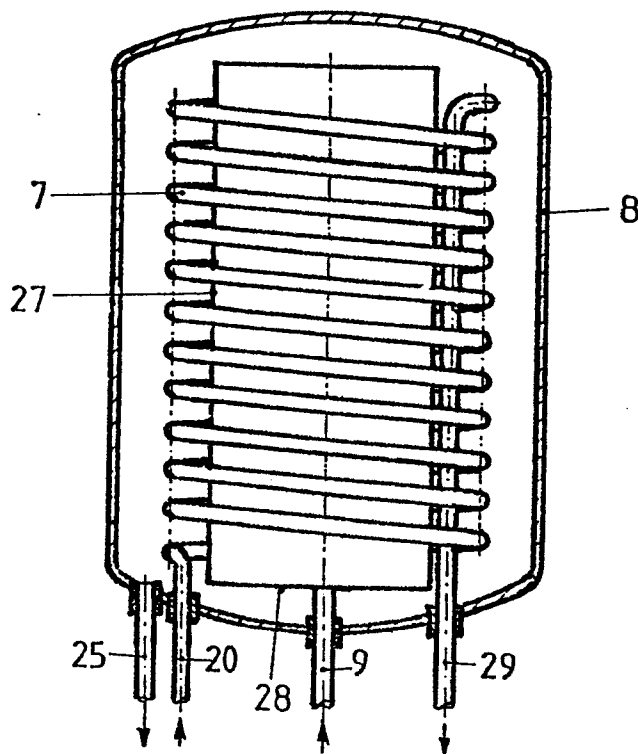


FIG. 2



European Patent
Office

EUROPEAN SEARCH REPORT

0178351

Application number

EP 84 20 1494

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. 4)
A, D	NL-A-8 300 867 (PLAATVERWERKENDE INDUSTRIE VAN WIJK EN BOERMA B.V.)		F 24 H 1/22

A	DE-C- 719 976 (BUDERUS'SCHE EISENWERKE) * The whole document *	1, 2	

A	DE-C-1 000 588 (MARX) * Figures *	1	

A	US-A-3 544 005 (VAILLANT) * Abstract; figure 2 *	1	

			TECHNICAL FIELDS SEARCHED (Int. Cl. 4)
			F 24 H
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 04-06-1985	Examiner VAN GESTEL H.M.
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 P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	