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(54) High safety and reduced maintenance water heater

(57) The present invention relates to a high safety and reduced maintenance water heater or boiler, comprising holding means for holding therein water to be heated and heating means for heating the water.

In the subject water heater, the water heating means comprise a microwave source.

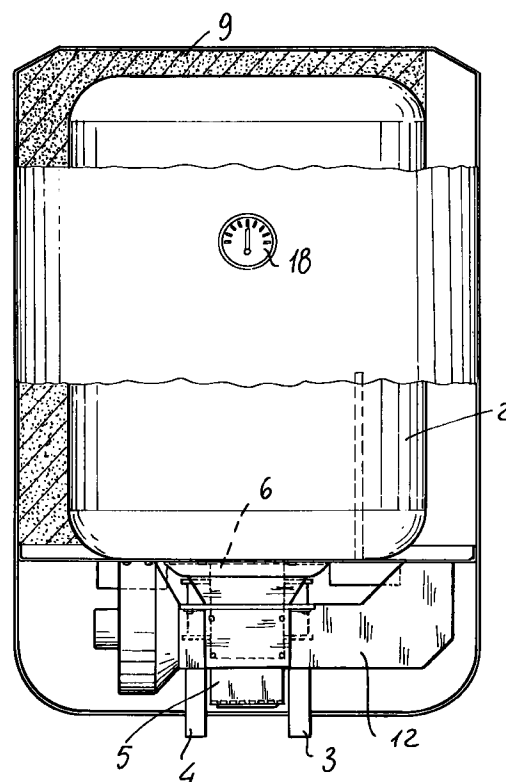


FIG. 1

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Description

BACKGROUND OF THE INVENTION

The present invention relates to a high safety and reduced maintenance water heater.

Electric water heating devices or boilers are already known, which conventionally comprise a suitably thermally insulated outer casing, in which is arranged a water holding tank, holding a set amount of water to be heated.

In this water tank is arranged an electric resistance by means of which the water in the tank is heated to a desired temperature.

The electric water heaters are preferably used in small environments since they provide a good operation safety; however they have the drawback that the heating electric resistance is quickly covered by limestone formations greatly reducing the heating efficiency thereof.

Because of this limestone formation, the electric water heaters require frequent maintenance operations in order to clean or replace the heating electric resistance, to recover the efficiency of the water heating operation.

Moreover, since the electric water heaters use a comparatively expensive power source, the operation costs thereof are comparatively high.

As an alternative to the electric water heaters, gas water heaters are also frequently used which have a comparatively low operation cost but which require a very accurate installation operation in order to meet very stringent safety rules.

Actually, as a gas water heater is installed, it is necessary to provide the environment in which the gas water heater is installed with a suitable aeration in order to prevent an air reduction inside the environment as caused by the gas combustion, as well as in order to prevent dangerous combustion emissions from being held in the environment.

On the other hand, also in these types of water heaters and, more specifically, in the so-called instantaneous type of heater, great limestone deposits are formed, which require inevitably extensive maintenance operations in order to provide the boiler with a good water heating efficiency.

SUMMARY OF THE INVENTION

Accordingly, the aim of the present invention is to overcome the above mentioned drawbacks, by providing a water heater which is very safe in operation and which, moreover, requires a very reduced maintenance.

Within the scope of the above mentioned aim, a main object of the present invention is to provide such a water heater which can operate without any problems even in small environments.

Another object of the present invention is to provide such a water heater which has a high water heating efficiency, which is held substantially constant in the time.

Yet another object of the present invention is to provide such a water heater which has very reduced operation costs.

According to one aspect of the present invention, the above mentioned aim and objects, as well as yet other objects, which will become more apparent hereinafter, are achieved by a high safety and reduced maintenance water heater, comprising holding means for holding water to be heated and water heating means for heating said water, characterized in that said water heating means comprise a microwave source.

BRIEF DESCRIPTION OF THE DRAWINGS

Further characteristics and advantages of the water heater according to the present invention will become more apparent hereinafter from the following detailed disclosure of two preferred, though not exclusive, embodiments of said water heater, being illustrated, by way of an indicative, but not limitative example, in the accompanying drawings, where:

Figure 1 is a front elevation partially cross-sectioned view illustrating a first embodiment of the water heater according to the present invention;

Figure 2 is a side elevation partially cross-sectioned view illustrating the water heater of figure 1;

Figure 3 is a schematic bottom view of the water heater shown in figure 1;

Figure 4 is a schematic top plan view illustrating the water heater shown in figure 1; and

Figure 5 is a schematic vertical cross-section view illustrating a second preferred embodiment of the water heater according to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

With reference to the number references of figure 1 to 4, the water heater according to the present invention, which has been generally indicated by the reference number 1, comprises holding means for holding herein a set amount of water, which holding means comprise, in the embodiment shown in these figures, a holding tank 2, into which, through an inlet duct 3, is supplied water to be heated, the heated water being delivered through a hot water delivery duct 4.

As shown, the subject water heater comprises, according to the invention, water heating means constituted by a microwave source or generator 5.

More specifically, the microwave source is coupled to the bottom of the tank 2 through a sector 6 made of a ceramic material or any other suitable materials.

In particular, the microwave source 5 can comprise an electrically powered microwave source (preferably with a supply source of 4,400 volts) which can be power-supplied by the electric mains, by providing, on the bottom of the water heater, an electric transformer 7 electrically coupled to said microwave source 5.

As shown, the tank 2 is housed inside a casing 8 and the gap between the outer surface of the water tank 2 and the inner surface of the casing 8 is filled by a suitable thermally insulating material 9.

The water heater is moreover provided with a thermostat switch 10 adapted to detect the temperature of the water held in the tank 2 and adapted to switch on or off said microwave source 5, in order to hold the water at a desired temperature.

On the power supply circuit of the microwave source 6 is moreover provided an anti-noise filter 11.

The subject water heater comprises, moreover, means for conveying a cooling air flow on the microwave source 5.

More specifically, this conveying means comprise a duct 12 extending about the microwave source 5 and communicating with the outer environment through an inlet 13 defined at a bottom region of the side surface of the casing 8 and through a pipe 14 extending inside the gap provided between the casing 8 and the water tank 2 and leading to a top region of the water heater.

The inlet 13 is suitably protected by a grid 15, a further grid 16 protecting the outlet of the pipe or duct 14.

Near the inlet 13 is provided a fan 17 which is driven together with the microwave source 5 so as to provide the necessary cooling air flow inside the duct 12, in order to prevent the microwave source 5 from overheating.

It should be apparent that the hot air at the output of the duct 12, by flowing through the pipe 14, will cooperate with the microwave source 5 in heating the water held in the water tank 2.

The subject water heater can moreover comprise a thermometer 18 for displaying the temperature of the water inside the water tank 2.

According to a modified embodiment shown in figure 5, in which the water heater according to the present invention has been generally indicated by the reference number 1a, the water tank 2 can be replaced by a coil duct 20 therethrough is caused to pass the water to be heated.

In this embodiment, the water coil 20 is housed in a chamber 21 defined in a casing 22 and the microwave source 23 is coupled to the bottom wall 24 of the chamber 21 through the interposition of a sector 25 made of a ceramic material or any other suitable materials.

Also in this embodiment, is provided a duct 26, air-supplied by means of a fan 27, likewise to the first preferred embodiment, in order to provide a suitable cooling for the microwave source.

In operation, the water heater according to the invention, the used heating power and the heated water

mass being the same, will provide a very reduction of the heating time required for heating the water.

Thus, it will be possible to have available a comparatively high amount of heated water in a comparatively short time.

In this connection it should be moreover pointed out that since the subject water heater does not use any combustion heat source, it can be installed, without any safety problems, even inside small environments.

Moreover, the subject water heater will provide a very high heating efficiency which will be held constant in the time.

From the above disclosure and from an observation of the figures of the accompanying drawings the great functionality and facility of use characterizing the subject water heater will be self evident.

In particular, it is to be pointed out that a water heater has been provided which is very safe in operation and which, moreover, does not require any maintenance operation, thereby providing a high efficiency for all the life thereof.

While the water heater has been disclosed and illustrated with reference to preferred embodiments thereof, it should be apparent that the disclosed embodiments are susceptible to many modifications and variations all of which will come within the scope of the appended claims.

Claims

1. A high safety and reduced maintenance water heater, comprising holding means for holding water to be heated and water heating means for heating said water, characterized in that said water heating means comprise a microwave source.
2. A water heater according to Claim 1, characterized in that said water holding means comprise a water tank.
3. A water heater according to Claims 1 and 2, characterized in that said water heater comprises a casing encompassing said water tank, between said casing and water tank being formed a gap filled by a thermally insulating material.
4. A water heater according to one or more of the preceding claims, characterized in that said microwave source is mounted on the bottom of said water tank through an interposition of a sector made of a ceramic material or any other suitable materials.
5. A water heater according to one or more of the preceding claims, characterized in that said water heater comprises moreover air conveying means for conveying a cooling air flow on said microwave source.

6. A water heater according to one or more of the preceding claims, characterized in that said cooling air conveying means comprise a duct extending about said microwave source and coupled to a pipe extending through a gap and leading to a top region of said casing, at an inlet of said duct being provided a fan for generating said cooling air flow conveyed along said duct and said pipe. 5
7. A water heater according to one or more of the preceding claims, characterized in that said water holding means comprise a coil duct supplied by water to be heated and arranged in a chamber defined in a casing, said heating means comprising a microwave source coupled to a wall of said chamber through an interposition of a sector made of a ceramic material or any other suitable material. 10 15
8. A water heater according to one or more of the preceding claims, characterized in that said microwave source is provided with an anti-noise filter. 20
9. A water heater according to one or more of the preceding claims, characterized in that it comprises moreover a thermostatic sensor for sensing the temperature of water being heated, said sensor being coupled to a power supply circuit of said microwave source. 25

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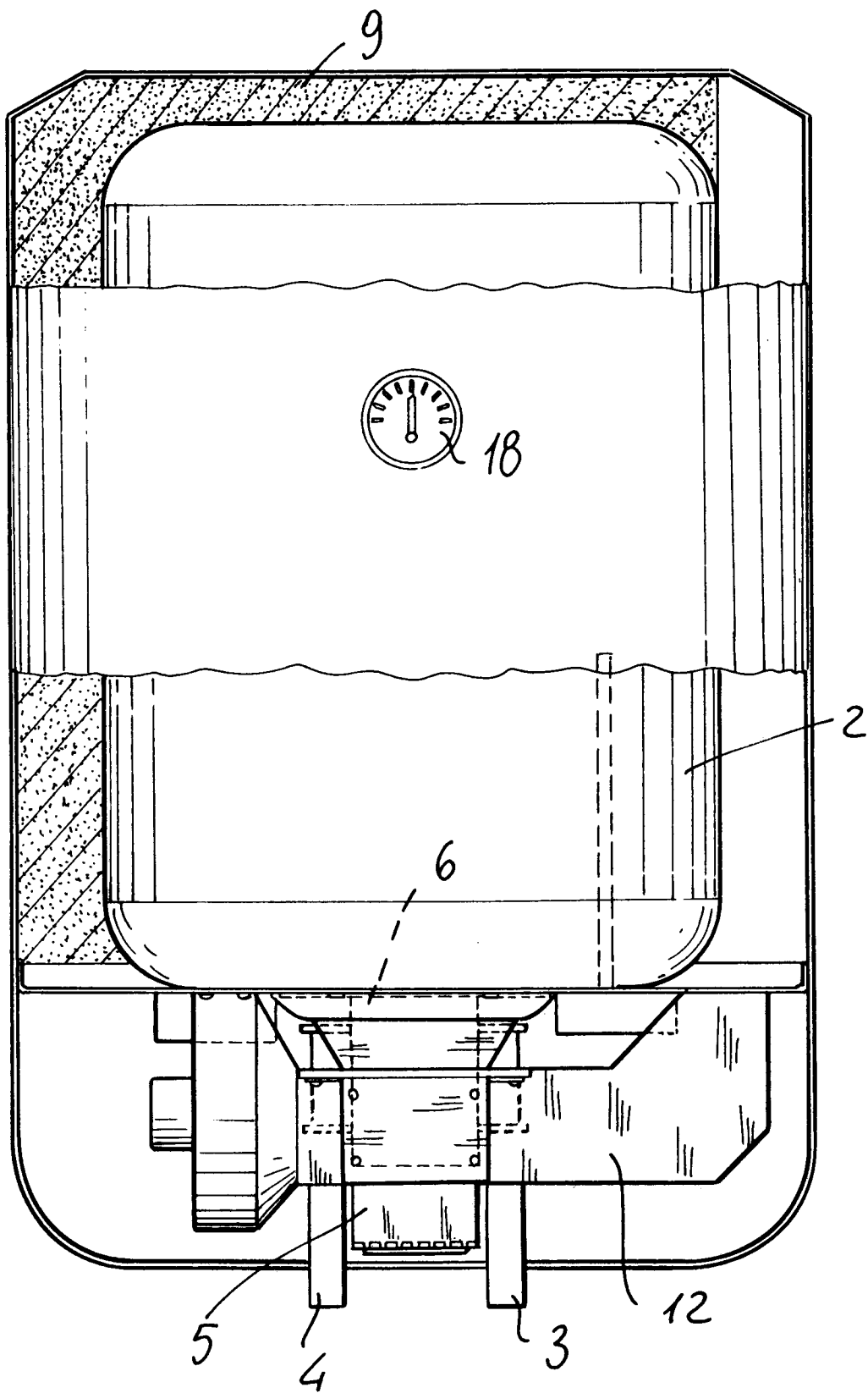


FIG. 1

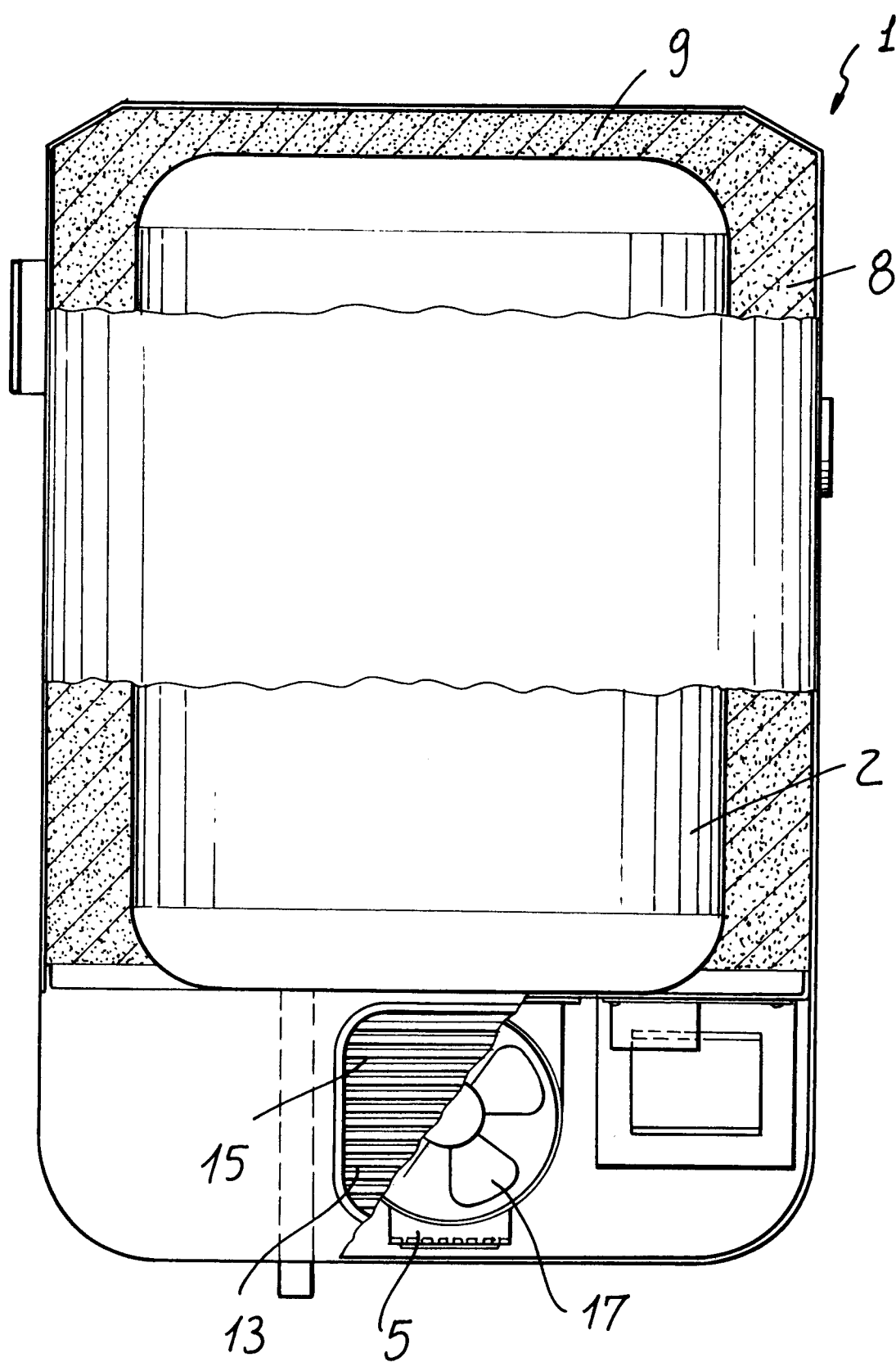


FIG. 2

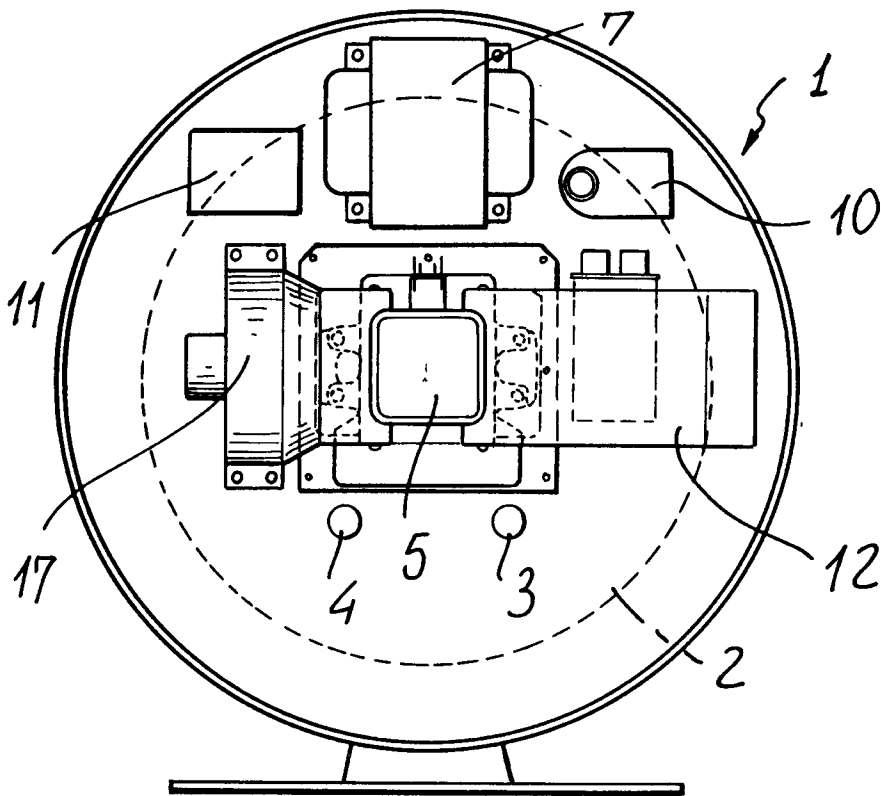


FIG. 3

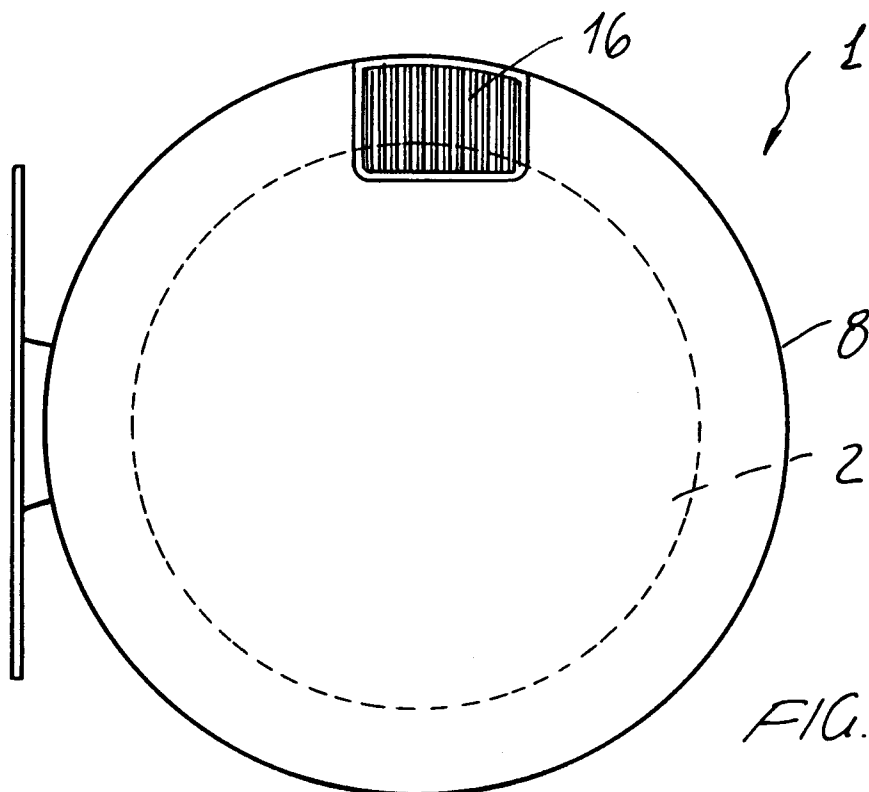
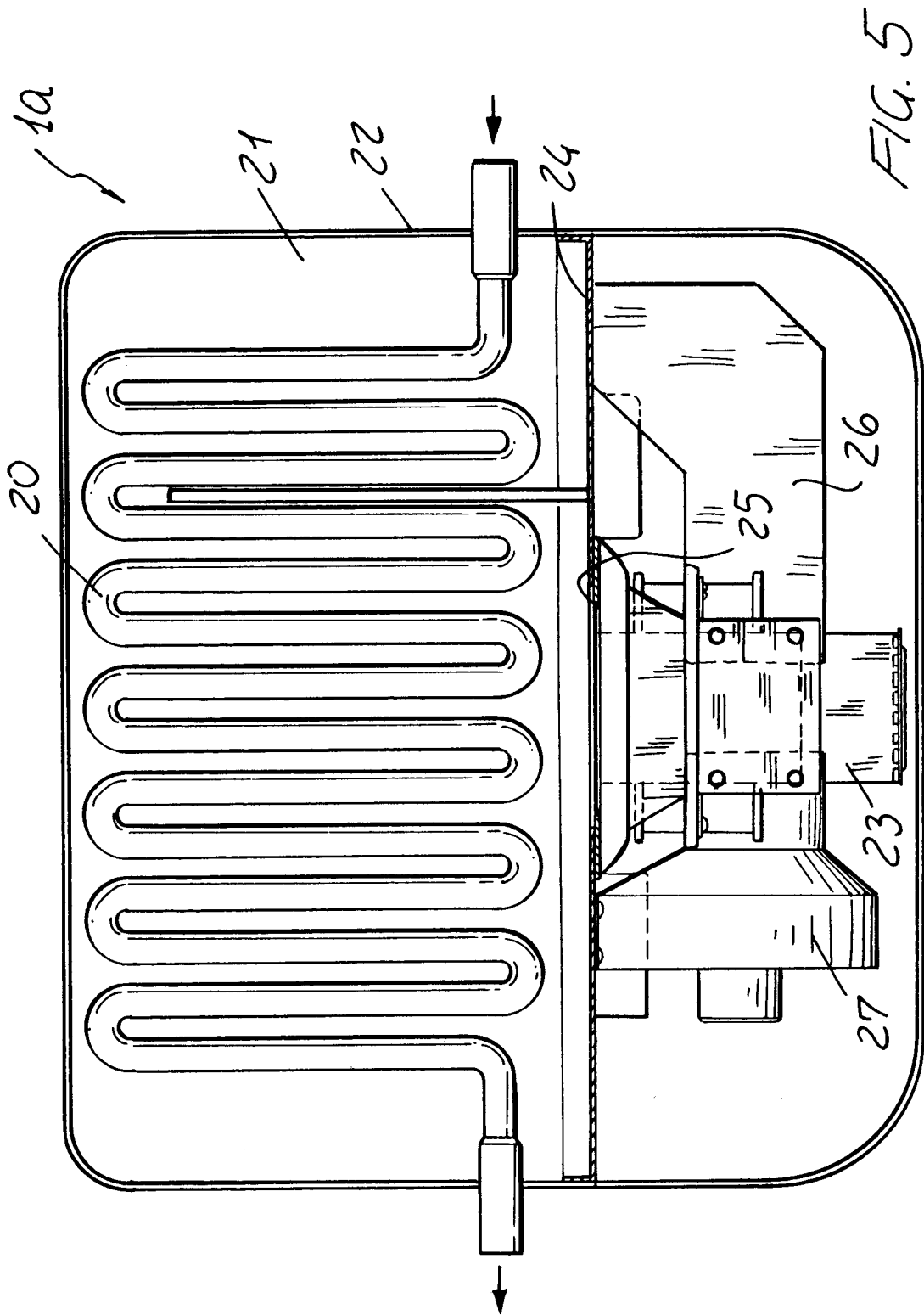


FIG. 4





European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 96 83 0640

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)
X	WO 93 00781 A (BRECCIA FRATADOCCHI ALBERTO) 7 January 1993 * page 6, line 10 - page 7, line 5; figures 2,3 *	1,2,4,7	F24H1/16 F24H1/18
X	WO 87 05093 A (APPLIED AGRICULTURAL RES) 27 August 1987 * abstract *	1,2,4	
X	US 4 029 927 A (MCMILLAN HUGH G) 14 June 1977 * abstract; figures *	1-4,9	
A	DE 28 52 399 A (BOSCH SIEMENS HAUSGERAETE;MATSUSHITA ELECTRIC IND CO LTD) 12 July 1979 * page 4, last paragraph - page 5, paragraph 1 *	5,6	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			F24H
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 20 May 1997	Examiner Van Gestel, H
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			

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