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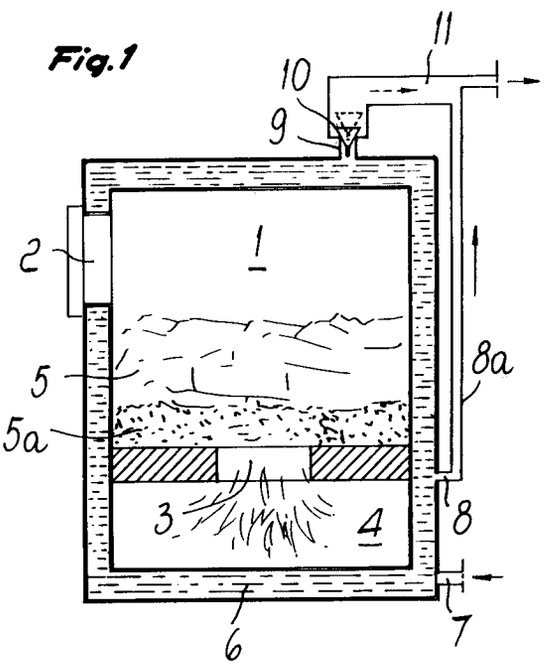
(54) Heat generator with biomass combustion.

(57) A heat generator with biomass combustion, comprising a biomass container (1) and a combustion chamber (4) which are comprised within a jacket (6) for fluid to be heated, characterized in that it comprises two couplings (7,9) for the outflow of the heated fluid which are connected to a single manifold (11); the first coupling (7), always open, is arranged substantially at the level of the base of the biomass container, and the second coupling (9) is controlled by a thermal expansion valve (10) and located substantially at the top of the jacket.

Fig.1



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The present invention relates to a heat generator with biomass combustion.

The development level achieved by heat generators used to heat a fluid, very often water, to be sent to heating systems, in which the combustion of biomasses (usually wood) occurs, is known.

These generators comprise a biomass container in which said biomass gasifies; the gas thus formed, after flowing through the bed of embers which naturally is at the base of the container, receives the addition of comburent in an appropriate burner and burns in a combustion chamber arranged below or to the side of the container; said container is thus always located in an elevated position, within the generator, with respect to said burner.

The biomass container and the combustion chamber are comprised within a structure which has a peripheral jacket for containing the fluid to be heated and a fume circuit for exchanging the heat of the products of combustion with the fluid to be heated before sending them to the stack.

In the known art, the cold fluid enters the jacket substantially at the base thereof, and the outlet for the heated fluid is located at the top of said jacket; accordingly, throughout the steps during which the generator produces low-temperature fluid, the biomass container is surrounded by a fluid which, due to its low temperature, causes the gases that form to condense on the walls of the container.

This phenomenon is intense due to the large percentage of moisture contained in the gases, and leads to high corrosion of the metal wall which delimits the container.

The aim of the present invention is therefore to provide a heat generator with biomass combustion in which condensation of the gases which form inside the biomass container is prevented.

The above aim is achieved by a heat generator with biomass combustion, according to the invention, which comprises a biomass container connected to a combustion chamber by means of a burner, said container and said combustion chamber being comprised within a structure which has a peripheral jacket for containing the fluid to be heated, with a cold-fluid inlet located at a coupling arranged substantially at the bottom, characterized in that it comprises two couplings for the outflow of the heated fluid from the jacket, said couplings being connected to a single manifold, the first coupling being always open and arranged substantially at the level of the base of the biomass container, the second coupling being controlled by a thermal expansion valve and being located substantially at the top of said jacket.

Further characteristics and advantages of the present invention will become apparent from the following detailed description of some preferred but not exclusive embodiments thereof, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a schematic view of a first embodiment of the invention;

figure 2 is a further schematic view of a different embodiment of the invention.

With reference to figure 1, the reference numeral 1 designates the biomass container, provided with the loading door 2 and connected, by means of a burner 3 which is not shown in detail, to a combustion chamber 4, in which combustion of the gases, released by the biomass 5 and passing through the ember bed 5a (which is at the base of the container 1), occurs, thereby generating the flame shown in the figure.

The container 1 and the combustion chamber 4 are comprised within a structure which includes the peripheral jacket 6 for containing the fluid to be heated, with the cold-fluid inlet at the coupling 7 located at the bottom, and also includes a fume circuit, not shown in the figure, which exchanges the heat of the products of combustion with the fluid to be heated and conveys said fumes to a stack.

All this occurs in a known manner.

The important characteristic of the present invention resides in the fact that it comprises two couplings for the outflow of the heated fluid from the jacket 6: a first coupling 8, always open, which is arranged substantially at the level of the base of the biomass container 1, and a second coupling 9, which is controlled by the thermal expansion valve 10 located at the top of the jacket 6, which is shown in closed position in solid lines and in open position in broken lines; the two couplings are connected to a single outflow manifold 11, and in particular the coupling 8 is connected to said manifold by means of the duct 8a.

During the operation of the generator with outflow of fluid at low temperature, the fluid involved in the circulation between the inlet and the outlet is only the fluid comprised within the jacket 6 between the levels of the inlet coupling 7 and of the outflow coupling 8, since the thermal expansion valve 10 is calibrated so that it remains normally closed so as to form, by preventing the outflow of fluid, a sort of dome of stagnant fluid which extends from the level of the coupling 8 to the top of the jacket 6 and is thus located at the peripheral region of the biomass container 1.

The addition of heat, although small, which reaches the stagnant fluid from the container 1, warms said fluid so as to raise it to a temperature, determined by the calibration of the thermal expansion valve 10, which is high enough to prevent condensation of the gases inside said container 1.

When the stagnant fluid reaches the temperature for the opening of the thermal expansion valve 10, a certain amount of fluid flows out of the generator and mixes, inside the manifold 11, by moving in the direction of the arrow shown in broken lines in the figures, with the fluid arriving from the duct 8a, and this outflow continues until the temperature drops to the value at which closure of the valve 10 is calibrated, thus restoring the above described conditions.

In summary, the condition has been obtained wherein, even if the generator operates at low temperature or intermittently, the biomass container 1 is constantly surrounded by a fluid having a temperature variable only within the calibration range of the thermal expansion valve 10, and thus between values which are selected so that they are high enough to prevent condensation of gases inside said container 1, thus eliminating any possibility of corrosion.

Figure 2 illustrates a different embodiment of the invention which relates to a generator in which, in a known manner, the biomass container 12 is arranged at the side of the combustion chamber 13, to which it is connected by means of the burner 14; the generator includes the jacket 15 of the fluid to be heated, which is supplied with cold water by means of the coupling 16.

In this embodiment, exactly as in the first embodiment described, there are two couplings for the outflow of the heated fluid from the jacket 15, and specifically the constantly-open coupling 17, which is arranged substantially at the level of the base of the biomass container 12, and the coupling 18, which is controlled by the thermal expansion valve 19 and is located at the top of the jacket 15; both couplings are connected to the outflow manifold 20.

Furthermore, there is the duct 21, which connects the top of the jacket 15 to a region arranged substantially at the level of the base of the container 12; the duct 21 comprises the pump 22, which is capable of producing circulation of the fluid in the direction of the arrow so as to cause mixing of the stagnant fluid in the dome in order to prevent the stratification which forms spontaneously therein from creating a temperature gradient leading to the presence of excessively low temperatures in the lower region which are incapable of preventing the forming of condensate on the walls.

Obviously, a duct such as the one designated by the reference numeral 21, provided with a pump 22, can be applied to a generator such as the one shown in figure 1, with the combustion chamber arranged below the biomass container.

The described invention is susceptible to numerous modifications and variations, all of which are within the scope of the inventive concept; all the details may furthermore be replaced with other technically equivalent elements.

In the practical embodiment of the invention, the materials employed, as well as the shapes and dimensions, may be any according to the requirements.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

Claims

1. Heat generator with biomass combustion, comprising a biomass container (1,12) which is connected to a combustion chamber (4,13) by means of a burner (3,14), said container and said combustion chamber being comprised within a structure having a peripheral jacket (6,15) for containing the fluid to be heated, with a cold-fluid inlet located at a coupling (7,16) arranged substantially at the bottom, characterized in that it comprises two couplings (7,9,16,18) for the outflow of the heated fluid from the jacket (6,15), said couplings being connected to a single manifold (11,20), the first coupling (7,16) being always open and arranged substantially at the level of the base of the biomass container (1,12), the second coupling (9,18) being controlled by a thermal expansion valve (10,19) and located substantially at the top of said jacket (6,15).

2. Heat generator according to claim 1, characterized in that it comprises a duct (21) which connects the top of the jacket (6,15) for containing the fluid to be heated to the region of said jacket which is located substantially at the level of the base of the biomass container (1,12), said duct (21) comprising a pump (22) suitable to make the fluid circulate from the top of the jacket toward the region at the level of the base of the biomass container.

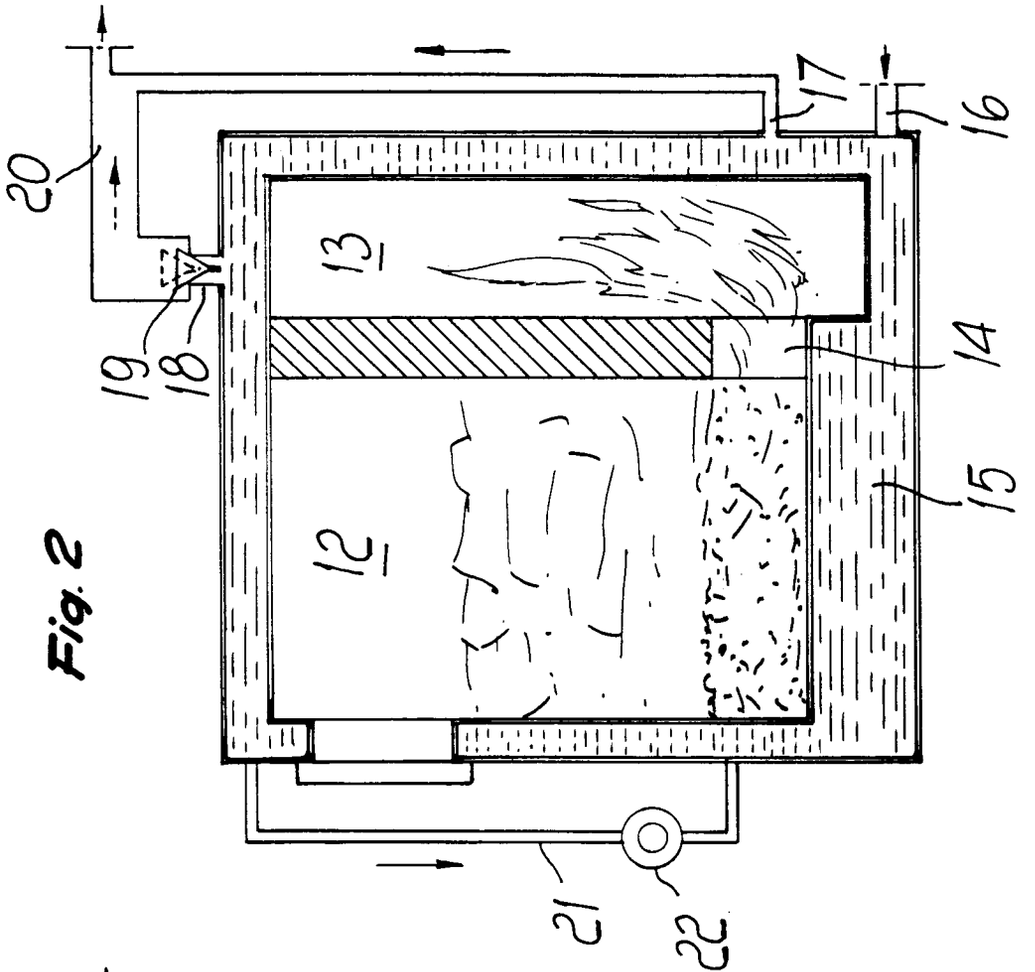

Fig. 2

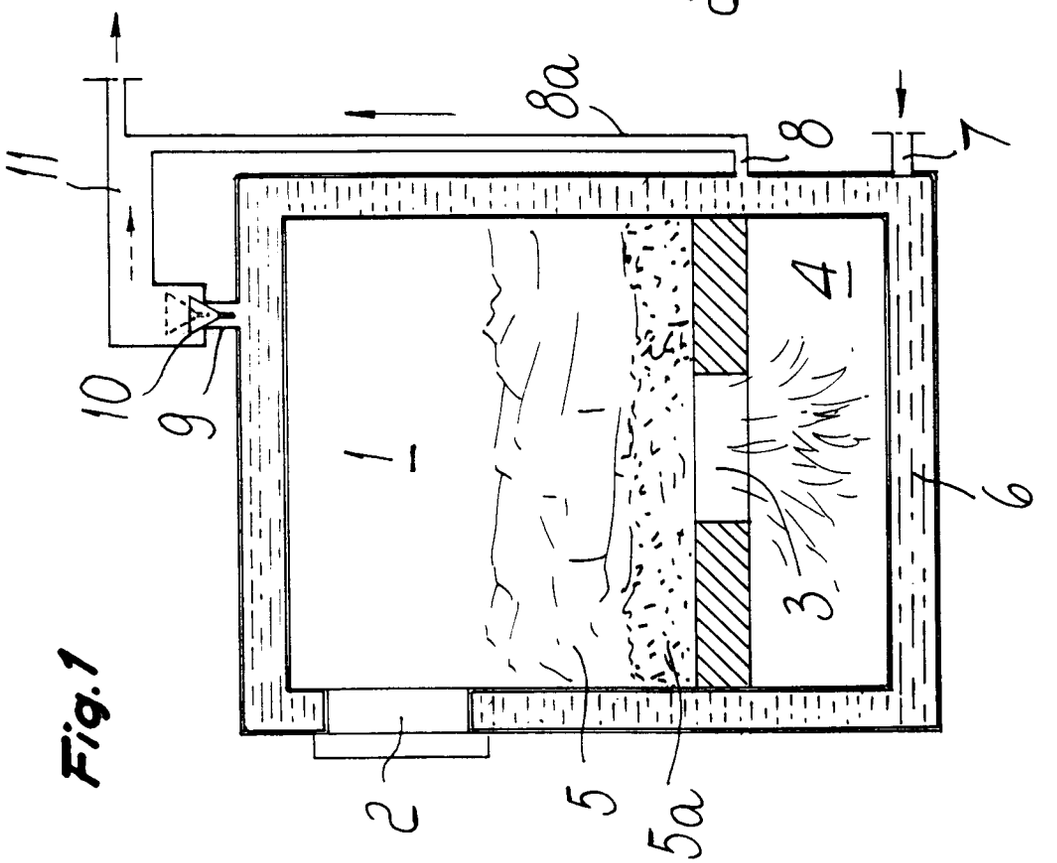

Fig. 1

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 94 10 8045

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.5)
A	EP-A-0 205 993 (MESCOLI-TECNOLOGIE SOLARI-S.N.C. DI MESCOLI SAURO E GIANNI) * abstract * ---	1	F24H9/00 F24H9/12
A	DE-A-30 30 565 (KÖRTING HANNOVER AG) * claims 1,6; figures 3-6 * ---	1	
A	DE-C-34 12 331 (INTERDOMO GMBH & CO HEIZUNGS - UND WÄRMETECHNIK) * the whole document * ---	1	
A	DE-U-88 13 582 (JOH. VAILLANT GMBH U. CO) * the whole document * -----	12	

TECHNICAL FIELDS SEARCHED (Int.Cl.5)

F24H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	1 September 1994	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
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E : earlier patent document, but published on, or after the filing date
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