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(54) Central heating boiler

(57) The invention relates to a central heating boiler, comprising a fumace (11) whose inlet (11a) is fitted with an oil or gas burner (12) and whose rear section is provided with an outlet (11b) for flue gases, a water space (10) encircling the fumace, through which is extended a heating water circulation (14, 15), as well as at least one heat exchanger for heating warm service water. The heat exchanger comprises a flattish container (3) located in the rear section of the furnace (11) and at a small distance from the rear wall of the fumace. The warm service water has its output (21) fitted with a thermostat (5) which is coupled to control said oil or gas bumer (12) on the basis of the service water temperature. In the boiler of the invention, the heat exchanger (3) is provided with an inlet pipe (31) whose end (32) opens into the interior of the heat exchanger (3) at a point substantially higher than an end (34) of its outlet pipe (33).

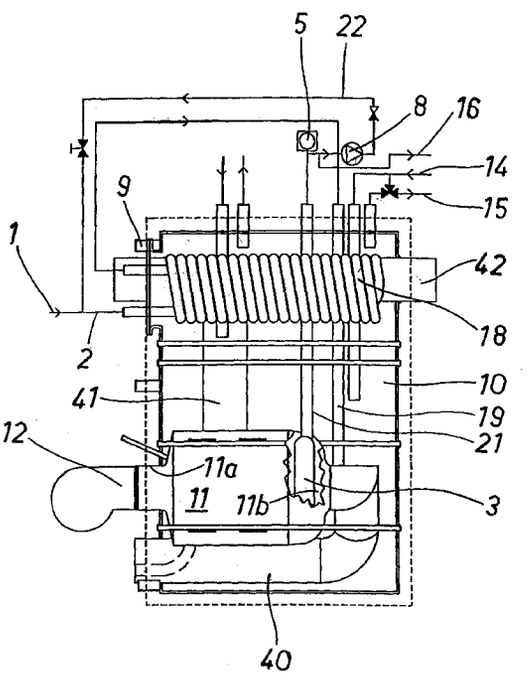

Fig.1

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Description

Central heating boiler

[0001] The present invention relates to a central heating boiler, comprising a furnace whose inlet is fitted with an oil or gas burner and whose rear section is provided with an outlet for flue gases, a water space encircling the furnace, through which is extended a heating water circulation, as well as at least one heat exchanger for heating warm service water, said heat exchanger comprising a flattish container located in the rear section of the furnace and at a small distance from the rear wall of the furnace, said warm service water having its output fitted with a thermostat which is coupled to control said oil or gas burner on the basis of the service water temperature. The invention relates also to a central heating boiler, comprising a furnace whose inlet is fitted with an oil or gas burner and whose rear section is provided with an outlet for flue gases, a water space encircling the furnace, through which is extended a heating water circulation, as well as at least one heat exchanger for heating warm service water, said heat exchanger comprising a flattish container located in the rear section of the furnace and at a small distance from the rear wall of the furnace.

[0002] One problem with prior known boilers is the slowness in terms of heating the service water. Especially in summertime, when only a slight heating or no heating at all is necessary, the boiler water becomes lukewarm and, thus, it will be necessary to heat the entire body of boiler water and to wait for it to warm up before it is possible to take a shower with warm water. As a consequence, it is quite common to employ electrically heated backup systems for producing warm service water during warm seasons. It is natural that this increases the overall costs.

[0003] WO publication 94/25806 discloses an improved central heating boiler which, during the season when heating is not necessary, only functions as a high-speed heater for warm service water and, during the season when heating is necessary, both as a heat-storing heating boiler and an efficient producer of warm service water. It is necessary to provide such a boiler with a container functioning as a standby supply of warm service water, which adds to the costs. Hence, an object of the present invention is to provide an even further improved central heating boiler, which operates by means of a powerful heat-exchanger container located in the furnace without a separate standby supply of warm service water, and makes it possible to maintain the boiler water at a relatively low temperature (e.g. about 45-55°C) even during the season when heating is necessary. Another object of the invention is to provide an improved central heating boiler, which is capable of achieving an effective heating of heating water, in which boiler the warm service water is heated by means of a conventional hot-water boiler spiral or in which warm service water is not produced at all.

[0004] In order to achieve these objectives, a central heating boiler according to a first aspect of the invention is characterized by what is set forth in the characterizing clause of claim 1.

[0005] The heating boiler of the invention can be provided with a combination, wherein the temperature of service water heated with a heat exchanger set in the furnace is measured by means of a separate thermostat which controls the operation of an oil or gas burner even when a second thermostat for measuring the temperature of boiler water is switched off. Such a control can be implemented simply by connecting the service water thermostat in parallel with the boiler water thermostat. A central heating boiler according to a second aspect of the invention is characterized by what is set forth in the characterizing clause of claim 12.

[0006] One exemplary embodiment of the invention will now be described in more detail with reference made to the accompanying drawings, in which:

- fig. 1 shows a boiler of the invention in a schematic vertical section;
- fig. 2 shows a plan view of a heat-exchanger container set in the furnace, and
- fig. 3 shows the heat-exchanger container of fig. 2 in a vertical section.

[0007] The boiler structure is as follows. There are heat-insulated wall panels defining a water space 10 which surrounds a furnace 11. The furnace 11 is e.g. in the shape of a horizontal cylinder and has its inlet 11a fitted with an oil or gas burner 12. The furnace 11 has its rear section provided with an outlet 11b for flue gases, from which extends a flue gas duct including a first, lower horizontal section 40, a vertical duct 41 connected therewith, and a second, upper horizontal section 42 connected with the vertical duct.

[0008] A cold-water pipe 1 has a branch 2 which is connected to a horizontal spiral heat exchanger 18, which is located in the upper portion of the water space 10 and from which the water is circulated through a pipe 19 into a heat-exchanger container 3 set in the furnace 11, wherein a relatively small amount of water heats up quickly to a temperature of 55-65°C, which is a proper temperature for warm service water.

[0009] A discharge pipe 21 for warm service water is provided with a service-water thermostat 5, which is connected in parallel with a boiler thermostat 9. This parallel connection makes it possible that, during the season when heating is necessary, both thermostats 5 and 9 control the burner in such a way that the burner 12 starts up whenever either one of the thermostats 5 or 9 requests more heat. However, during the season when heating is not necessary, the thermostat 9 can be inactivated, the burner 12 being controlled solely by the warm service-water thermostat 5 used for regulating the temperature of service water.

[0010] In winter operation, as the burner 12 starts up most of the time under the control of the boiler thermostat 12, use is made of a circulation pump 8 and a return line 22. When the burner 12 starts up, the circulation pump 8 starts rotating and carries the hot water from the furnace heat exchanger 3 to the boiler spiral 18 used for warming up the boiler water. By virtue of this, the burner 12 has its combustion time substantially reduced, since the power of the heat exchanger 3 can now be exploited also for heating the boiler water. A considerable saving of energy is thus accompanied by securing a quick sufficient supply of warm service water. It has been confirmed in practice that, as hot water is required by the household, the burner starts up in a matter of seconds and keeps running as long as the water is being used, e.g. in shower. After the use of water is over, the burner will still run for another 10-15 seconds. If there is a lengthy pause in the use of water, e.g. water is not used for 10 hours, the burner will start up 2-3 times during that period, each running time being 10-15 seconds in order to secure a continuous standby status for the supply of warm service water.

[0011] The boiler thermostat 9, which is switched off in summertime, is in wintertime set at an operating temperature of e.g. 45°C, which is well sufficient for heating. In terms of operation, the boiler of the invention is equivalent to two separate boilers built together for complementing each other's operation.

[0012] Reference numeral 14 is used to indicate the return tube of a heating network and reference numeral 15 the output of a heating network to heating radiators. A pipe 16 is used for carrying warm service water to the household.

[0013] Fig. 2 depicts a disk-shaped heat exchanger 3 in a plan view.

[0014] Fig. 3 depicts a more detailed view of the heat exchanger 3 of the invention in terms of its internal structure. The disk-shaped container 3 houses an internal section 31 connected with a service-water inlet pipe 19 and an internal section 33 connected with an outlet pipe 21. The inlet pipe 31 has its end 32 opening into the interior of the container 3 at a point substantially higher than an end 34 of the outlet pipe 33. In the illustrated embodiment, the end 32 of the inlet pipe 31 is housed in a top section 3A of the container 3 and the end 31 of the pipe 33 in a bottom section 3B of the container 3. Reference numeral 36 is used to indicate an imaginary parting line dividing the container 3 in said top section and bottom section. Reference numeral 35 is used to indicate a lead-in bushing for the inlet and outlet pipe. The pipes 31 and 33 have the respective ends 32 and 34 thereof preferably chamfered with respect to the horizontal plane, as shown in fig. 3.

[0015] A removable spiral component may be inserted in the horizontal sections 40 and 42 of a flue gas duct, which is capable of creating turbulence in flue gases for thus enhancing the transfer of heat to the water space 10 as the spiral component decelerates the discharge of flue gases from the boiler.

[0016] The boiler of the invention has been able to reach low temperatures for flue gases, even less than 100°C, which delivers sufficient heat to boiler water maintained relatively cool, preferably at about 45-55°C, during the heating season. The removability of the spiral component facilitates a sweeping operation.

[0017] In the central heating boiler according to a second aspect of the invention, the heat exchanger 3 present in the furnace opens into the furnace-surrounding water space 10 at its bottom and top portion, the boiler water present in the water space passing through the heat exchanger for an intensified heating of the boiler water. In this solution, the heat exchanger 3 is preferably without the internal pipe sections 31 and 33 for allowing an effective passage for the boiler water through the heat exchanger from the bottom upwards. Such a boiler can be designed without the preparation of warm service water, or such preparation of warm service water can be performed by means of a conventional hot-water boiler spiral (such as e.g. the spiral 18 in fig. 1).

Claims

1. A central heating boiler, comprising a furnace (11) whose inlet (11a) is fitted with an oil or gas burner (12) and whose rear section is provided with an outlet (11b) for flue gases, a water space (10) encircling the furnace, through which is extended a heating water circulation (14, 15), as well as at least one heat exchanger for heating warm service water, said heat exchanger comprising a flattish container (3) located in the rear section of the furnace (11) and at a small distance from the rear wall of the furnace, said warm service water having its output (21) fitted with a thermostat (5) which is coupled to control said oil or gas burner (12) on the basis of the service water temperature, characterized in that the heat exchanger (3) is provided with an inlet pipe (31) whose end (32) opens into the interior of the heat exchanger (3) at a point substantially higher than an end (34) of its outlet pipe (33).

2. A heating boiler as set forth in claim 1, characterized in that the inlet pipe (31) has its end (32) housed in a top section (3A) of the heat exchanger (3) and the outlet pipe (33) has its end (34) housed in a bottom section (38) of the heat exchanger (3).

3. A heating boiler as set forth in claim 1 or 2, characterized in that said pipes (31, 33) are substantially parallel inside the heat exchanger (3) at least over some of the length thereof, extending in an inclined position relative to the vertical plane.

4. A heating boiler as set forth in claim 3, characterized in that the inlet (31) and/or outlet pipe (33) has its

end (32; 34) chamfered relative to the horizontal plane.

5. A heating boiler as set forth in any of the preceding claims, characterized in that the heating boiler is provided with yet another thermostat (9) for measuring the temperature of boiler water.

6. A heating boiler as set forth in daim 5, characterized in that the thermostat (5) for warm service water is connected in parallel with the thermostat (9) for boiler water.

7. A boiler as set forth in any of claims 1-6, characterized in that said heat-exchanger container (3) is in the shape of a flat disk.

8. A boiler as set forth in any of the preceding claims, characterized in that the boiler has its water space (10) provided with a spiral heat exchanger (18) for circulating warm service water therethrough into said heat-exchanger container (3) present in the furnace, and that the spiral heat exchanger (18) is located in the top portion of the water space (10) in a substantially horizontal position.

9. A boiler as set forth in claim 8, in association with claim 5, characterized in that the outlet pipe for warm service water is provided with a circulation pump (8), which starts up whenever the boiler thermostat (9) starts up the burner (12), said circulation pump (8) delivering the hot water through a return pipe (22) from the heat-exchanger container (3) of the furnace to said spiral heat exchanger (18).

10. A boiler as set forth in any of the preceding claims, characterized in that the outlet (11) for flue gases is provided with a flue gas duct which includes a first, lower horizontal section (40), inside which is housed a removable spiral component.

11. A boiler as set forth in claim 10, characterized in that the flue gas duct is further provided with a second horizontal section (42), inside which is housed a similarly removable spiral component, said second horizontal section (42) extending within the spiral heat exchanger (18) present in the top section of the water space (10).

12. A central heating boiler, comprising a furnace (11) whose inlet (11a) is fitted with an oil or gas burner (12) and whose rear section is provided with an outlet (11b) for flue gases, a water space (10) encircling the furnace, through which is extended a heating water circulation (14, 15), as well as at least one heat exchanger for heating warm service water, said heat exchanger comprising a flattish container (3) located in the rear section of the furnace (11) and at a small distance from the rear wall of the furnace, characterized in that the heat-exchanger container (3) opens at its top and bottom portion into the water space (10) surrounding the furnace (11).

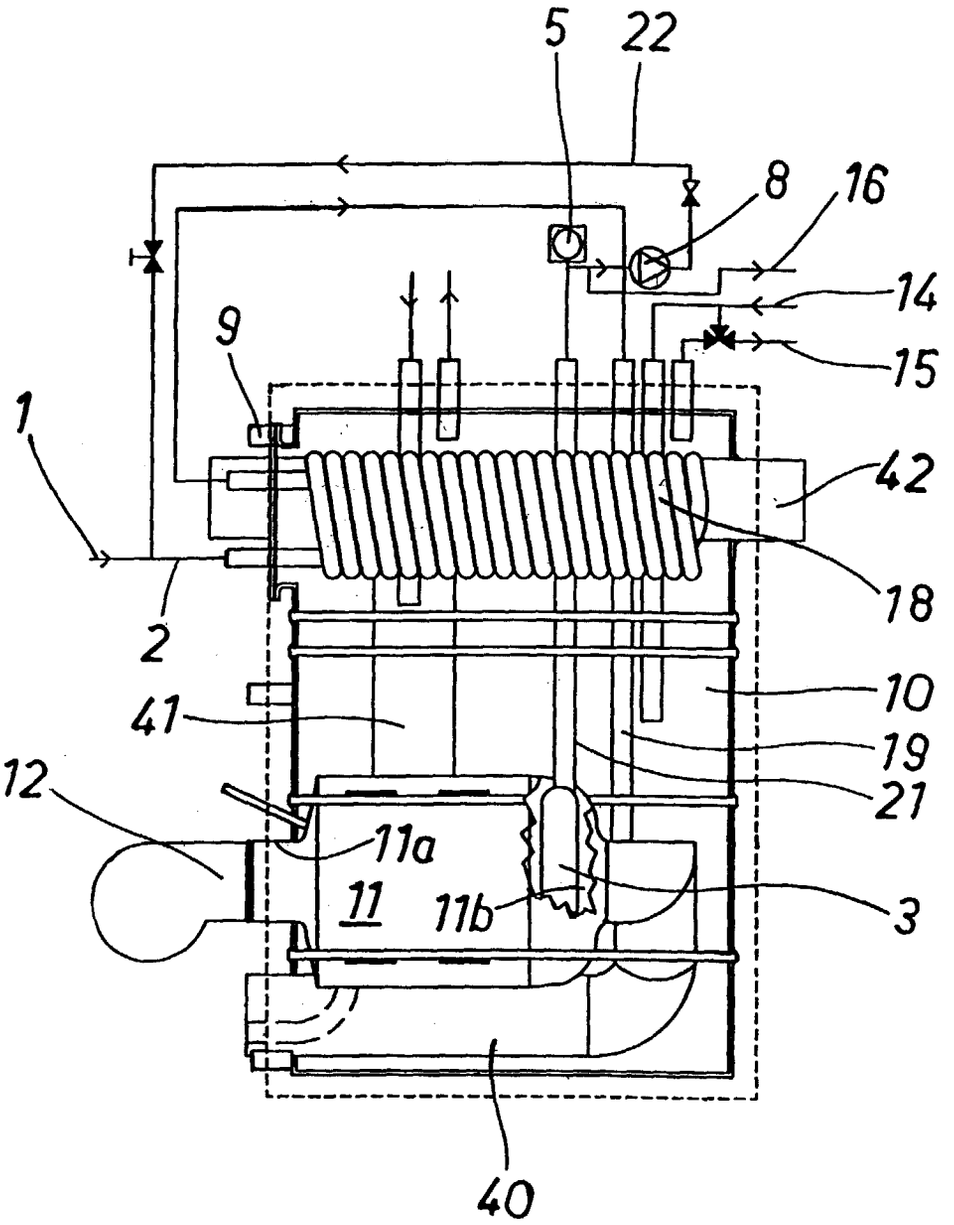

Fig. 1

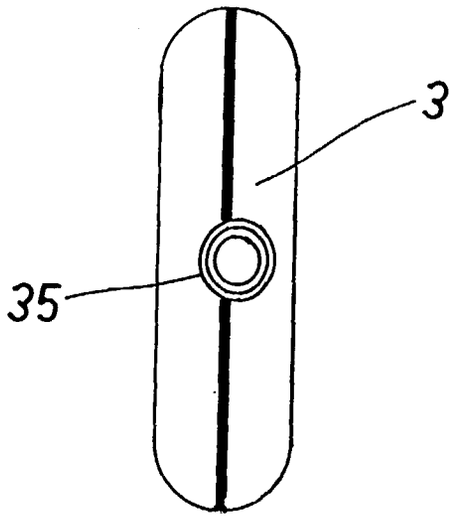

Fig. 2

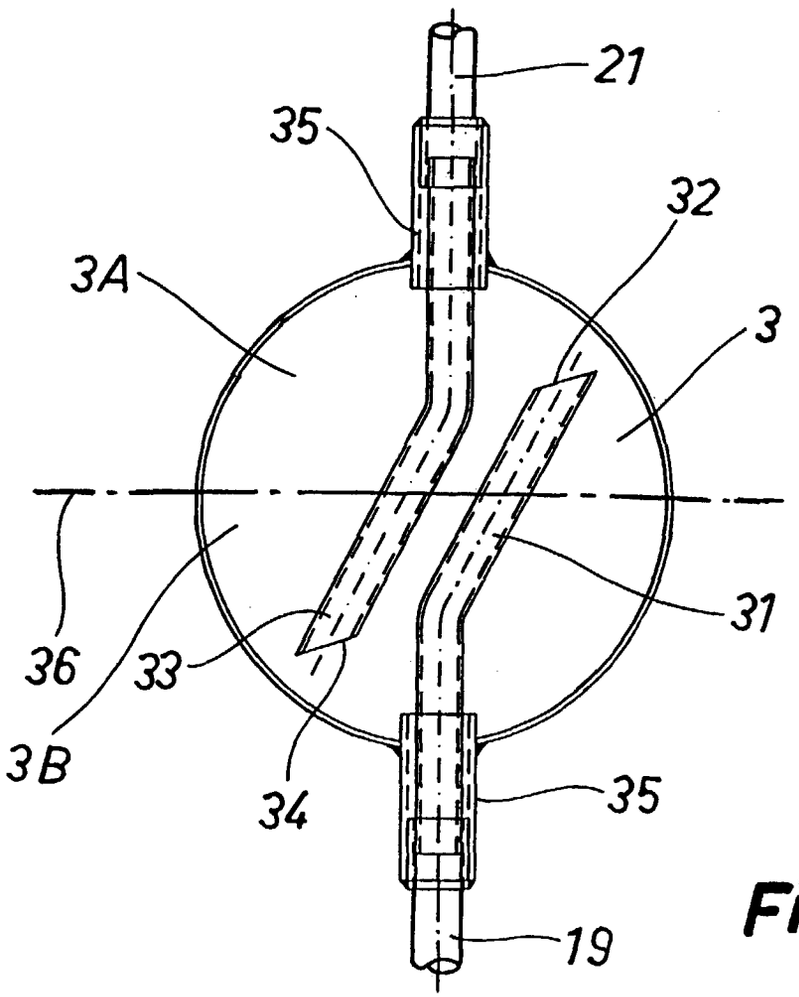

Fig. 3