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STEAM GENERATOR AND BOILER

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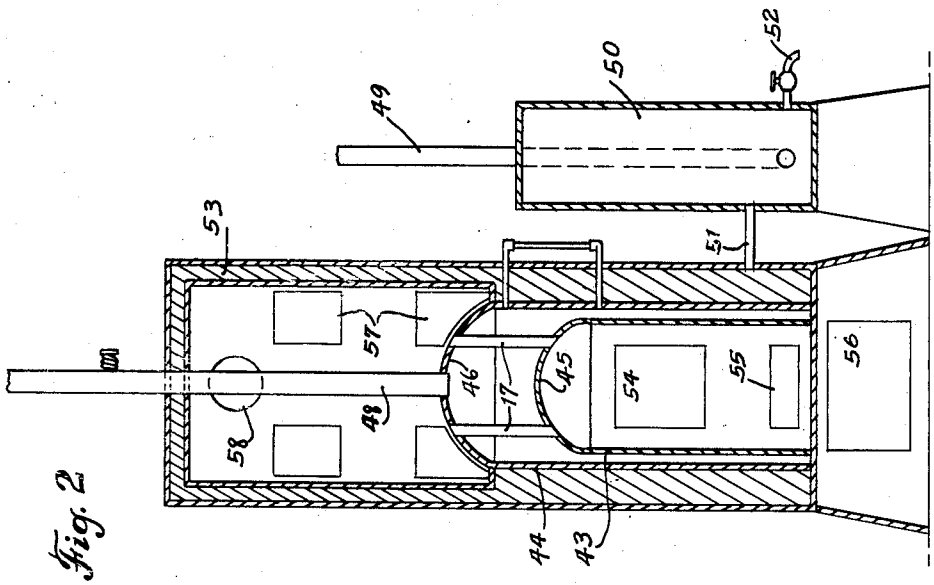


Fig. 2

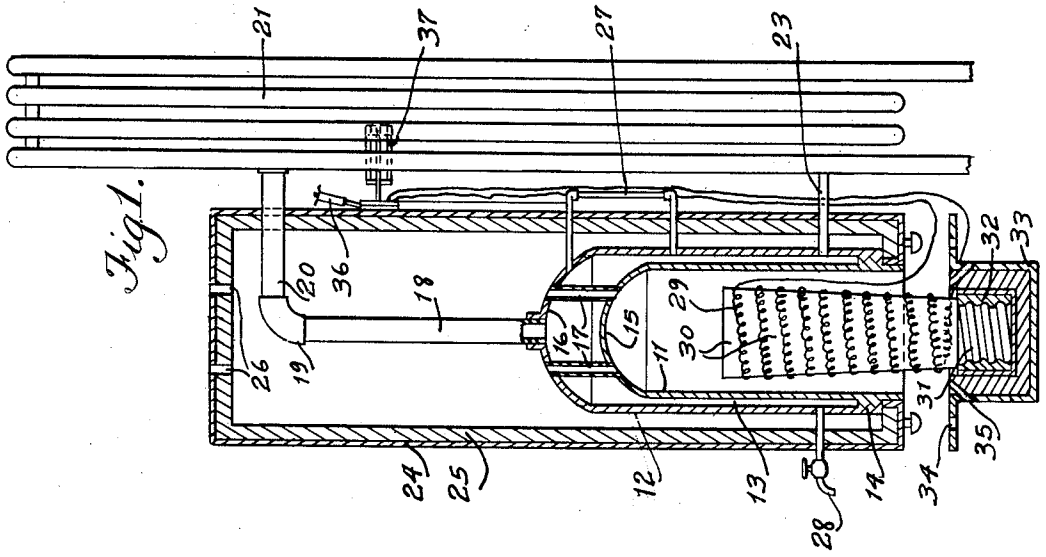


Fig. 1.

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STEAM GENERATOR AND BOILER

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5 Claims. (Cl. 219—38)

The invention relates to new and useful improvements in steam-generators or boilers, and has for its object the provision of a small-volume steam-generator or boiler for rapid production of a limited amount of steam, to be used in particular for such applications, in which the steam is only circulating through a closed system of conduits.

It is a well known drawback and inconvenience in connection with ordinary boilers for house-heating and other household or industrial applications of heat, that the production of the steam and the transfer of the heat to the place of its application is extremely uneconomic and subject to considerable loss of time.

The object of the present invention is to overcome these disadvantages of the ordinarily used system of steam production and steam-distribution, and to provide a steam-generator, which is adapted to produce within a few minutes a limited amount of steam ready to be used for different household or industrial purposes. It is further an object of the invention to provide a quick-action steam-generator, which may be used in close direct cooperation with individual radiators in house-heating plants, so that by the application of my new and improved heating-system in the midst of the cold winter season a single living room may be heated up to comfortable temperature within 10 to 20 minutes. Another object of the invention is, to provide a standard-type of a small-volume steam-generator, which can easily be adapted to different household or industrial purposes, for instance to the end of obtaining some quick boiling water for the breakfast-table, or in the kitchen, or in barber or beauty-shops, in dentists' and doctors' offices, for the sterilizing of instruments in the operating-room of a hospital, and so on.

With these and similar objects in view I have devised a steam-generator having the form of a double-walled upright boiler-cylinder in which the space between the two walls is filled with water and serves for the production of steam, whereas the space within the inner cylindrical wall contains the heat-providing means, which may be either an electrically operated heating body or an ordinary furnace for burning solid or liquid fuel. Further I provide in connection with the said steam-generator a small reserve-tank filled with water, and in the case of a room-heating plant I am using the lower part of the heating-radiator as such a reserve-tank.

In the drawing I have illustrated some preferred embodiments of my invention, whereby:

Figure 1 shows in full lines a vertical section through the preferred form of an electrically operated steam-generator.

Figure 2 shows a vertical section through another embodiment of the invention, which comprises a fuel-heated steam-generator connected with a water-reserve-tank.

Referring more particularly to the drawing in the first embodiment of the invention as shown in the Figure 1, the steam-generating boiler consists of two concentrically arranged upright cylinders 11, 12, with a narrow space 13 for a water-jacket between them. The lower ends of the metallic cylinder walls 11, 12 are fastened to each other by a screw-threaded connection 14 or in any other suitable manner, while the upper ends of the cylinders are individually closed by domes 15, 16, and are connected with each other by a number of pipes 17 arranged preferably in a circular zone around the axis, which pipes serve as air-vents as will be hereinafter described. From the central part of the upper dome 16 starts the vertical steam-conducting pipe-line 18, continued by the bent pipe-fitting 19, and then by the horizontal pipe 20, which connects into the upper part of an ordinary radiator 21 for room-heating. The base or foot 22 of the radiator may simply stand on the floor or may comprise two pipes, connected to a complete radiator-feeding ssytem of pipes extending from a main boiler in the cellar through the whole house, in which latter case valves are to be provided in the two branch-pipes connecting the radiator 21 with the central main system, so that the individual radiator 21 can be shut off from the main system and heated separately by the steam-generator of the present invention. The lower part of the radiator 21 is connected by the pipe 23 to the water-jacket 13 between the two cylinders. In order to increase the efficiency of the steam-generator and to prevent people from being burned by touching the hot boiler-walls there is provided a box-like casing consisting of an outer metallic-wall 24 with an inner asbestos lining, 25, which casing encloses the whole steam-generating boiler, except for its lower end and the steam-conducting pipes 18, 19, 20. In the upper wall of the casing are a number of air-vents 26, to let the hot air pass out of the inner space within the casing. At the outer side of the casing is preferably further provided a vertical glass gauge 27 with its ends connected to the upper part of the water-jacket 13 and to the steam-filled space below the upper dome 16, respectively, so as to

indicate at the outside, the water-level within the steam-generating boiler; and at the bottom of the water-jacket 13 may be arranged a drain-pipe 28 with a cock or valve therein.

The electrically operated heating-body of the first embodiment of the invention consists of a resistance wire 29 coiled round a slightly conical carrier 30 of refractory material. The lower-plug-end 31 of this heating-body is screwed in the customary manner into a socket 32, which is surrounded by insulating cap 33, fastened to a metallic carrier, the flange-plate of which is detachably fixed to the bottom of the casing, preferably by means of a bayonet-connection 34. In order to prevent an excess heating of the heating body some air-vent holes 35 in the insulating cap 33 introduce fresh air into the space between the heating body and the inner cylindrical boiler-wall; the air, transfers the heat from the heating body to the inner boiler-wall 11 and dome 15, thus heating the water in the jacket 13 and producing the steam which collects between the two domes 15 and 16 and in the pipes 18, 19, 20. The hot air then passes through the vents 17 into the larger casing, and continues there the heating of the boiler and pipes from their outsides, and finally the hot air escapes through the vents 26 into the room to be heated. The electricity is fed to the resistance-wire 29, respectively to the socket 32, by the conductors 36, extending along the outer wall of the casing and in the line of these conductors I prefer to insert an automatic switch 37, fastened to the upper part of the casing, and controlled by the radiator in the well known manner, so as to switch off the current as soon as the temperature or pressure of the steam within the radiator rises to a certain predetermined amount. The lower part of the radiator and the boiler are filled with a sufficient amount of water, so that the water level is a little above the lower dome 15, as indicated in the Figure 1. Then the comparatively small volume of water in the jacket 13 and on top of the dome 15 will be heated within a few minutes to the boiling point, the evaporated steam fills the space between the two domes 15 and 16, rises in the pipe 18, passes through the bent pipe 19 and the pipe 20 and fills the radiator 21. The continued activity of the electric heating body 30 produces some more steam in the steam-generator, and after short time the rising steam-pressure within the radiator will operate the automatic switch 37, so as to switch off the current of the electricity, thus preventing the steam-generator from being overheated. If, after some time, the temperature of the radiator 21 drops and some steam in it is condensed and flowing down into the radiator, the automatic switch will again switch on the electric current and the steam-generation will be started again.

If the steam-generator according to my invention is not to be used in connection with a radiator for room-heating, but for the heating of water for any household or industrial purposes, then the construction has to be slightly changed, as shown by the dotted lines in Figure 1. According to this modified construction a flat basin 38 containing the water to be heated is placed on top of the box-like casing 24, 25; instead of the radiator a water-reserve-tank 39 is arranged at the side of the casing, and the bent pipe 19 with the horizontal pipe 20 is substituted by a straight elongation of the vertical steam-conducting pipe 18. This elongated pipe passes through the top wall of the box-like casing and through the bottom of the basin 38, and is continued by a looped or coiled horizontal pipe 40, which fills the lower part of the basin, preferably in the manner as to form a false bottom in this basin. From the end of this coiled or looped pipe 40 a vertical pipe-connection 41 leads back into the water-reserve-tank 39. The working of this modified construction is analogous to that of the before described first embodiment.

Whereas the first-described embodiment of my invention is particularly adapted to be used as an improvement supplemental to already existing house-heating plants having a main boiler in the cellar and a main piping-system extending through the whole house, the embodiment shown in the Figure 2 may be preferred in the heating of smaller country houses, bungalows or separate apartments. In this second embodiment the steam-generator proper consists likewise of two vertical concentric cylinders 43, 44 with upper domes 45, 46, which are connected by a number of pipes 47, to serve as the draught for the fire-gases. From the upper dome 46 starts the vertical pipe-line 48, conducting the steam to radiators or other apparatuses, and these radiators or other apparatuses are connected, by the return-pipe 49, with the small water-reserve-tank 50 arranged at the side of the generator. The pipe 51 feeds the water from the tank 50 to the water jacket between the cylinders 43 and 44, and a drain 52 allows the emptying of the water-tank 50. This embodiment provided likewise a box-like casing 53 round the steam-generator, which casing consists of an outer metallic wall and an inner metallic wall and a heat-insulating filling between the two walls. The inner cylinder 43 contains a furnace of any suitable type, to burn a solid or liquid fuel; and in adaptation to the used kind of furnace several doors are provided at the steam-generator and at its base, for instance a coaling door 54, a grate-door 55 and an ashes-door 56. The box-like casing 53 is likewise provided with some clean-out-doors 57, to allow the removal of soot from the space between the casing and the steam-generator; and the fire-gases passing through this space are conducted away through the flue 58. The reserve-tank 50 and the steam-generator are filled with water up to the marked water-level, which can be read on the glass gauge 59, and the main steam-pipe 48 is preferably provided with a safety-valve 60. After lighting the fire on the furnace the production of the steam and its circulation through the whole system of conduits takes place exactly in the same manner as described above with reference to the first embodiment, or in the manner practiced in ordinary steam-heating plants.

It is obvious that changes may be made in the form, construction and arrangement of the several parts, as shown, within the scope of the appended claims, without departing from the spirit of the invention, and I do not therefore wish to limit myself to the construction and arrangement shown and described herein.

What I claim as new, and desire to secure by Letters Patent of the United States, is:

1. A small volume steam heat generator, comprising in combination a vertical small volume steam generating boiler consisting in a water jacket between two vertical walls and a steam collecting space between the two domed top walls closing the two vertical side walls, an electric heater within the heating chamber formed by the inner vertical wall and the inner end wall of the boiler, a vertical box-like casing

surrounding with its lower part the boiler and forming a hot air chamber including the boiler, open-ended pipes connecting the two top walls of the boiler, so as to provide passages from the heating chamber to the hot air chamber, a pipe connecting the water jacket of the boiler, and a pipe connecting the steam collecting space of the boiler, respectively, to a heat distributing and water accumulating source, substantially as shown and described.

2. A small volume steam heat generator comprising in combination a vertical small volume boiler consisting in a water jacket between two vertical walls and a steam collecting space between the two domed top walls closing the two vertical side walls, an electric heater within the heating chamber formed by the inner vertical side wall and the inner end wall of the boiler, a vertical box-like casing surrounding within its lower part the boiler and forming a hot air chamber including the boiler, open ended pipes connecting the two top walls of the boiler so as to provide passages from the heating chamber to the hot air chamber, a heat distributing and hot water accumulating source at the side of the boiler, a thermostatic controller fixed upon said latter source and adapted to switch on or off the electric current, and a pipe connecting the water jacket of the boiler, and a pipe connecting the steam collecting space of the boiler, respectively, to the said heat distributing and hot water accumulating source.

3. A small volume steam heat generator comprising in combination a vertical small volume boiler consisting of a water jacket between two vertical walls and a steam collecting space between the two domed top walls closing the two vertical side walls, an electric heater within the heating chamber formed by the inner vertical side wall and the inner end wall of the boiler, a vertical box-like casing surrounding with its lower part the boiler and forming a hot air chamber including the boiler, open ended pipes connecting the two top walls of the boiler, so as to provide passages from the heating chamber to the hot air chamber, a heat distributing and water accumulating source at the side of the boiler, and a pipe connecting the water jacket of the boiler, and a pipe connecting the steam collecting space of the latter, respectively, to the said heat distributing and water accumulating source.

4. A small volume steam heat generator comprising in combination: a vertical small volume steam generating boiler consisting of a water jacket between two vertical walls, and a steam-collecting space between the two domed top walls closing the two vertical side walls, an electric heater within the heating chamber formed by the inner vertical wall and the inner end wall of the boiler, a vertical box-like casing surrounding with its lower part the boiler and forming a hot air chamber including the boiler, open ended pipes connecting the two top walls of the boiler, so as to provide passages from the heating chamber to the hot air chamber, a heat distributing and hot water accumulating source, and a pipe connecting the water jacket of the boiler, and a pipe connecting the steam collecting space of the latter, respectively, to the said heat distributing and hot water accumulating source.

5. A small volume steam heat generator comprising in combination a vertical small volume boiler consisting in a water jacket between two vertical walls and a steam collecting space between the two domed top walls closing the two vertical side walls, an electric heater within the heating chamber formed by the inner vertical side wall and the inner end wall of the boiler, a vertical box-like casing surrounding with its lower part the boiler and forming a hot air chamber including the boiler, open ended pipes connecting the two top walls of the boiler so as to provide passages from the heating chamber to the hot air chamber, a heat distributing and hot water accumulating source at the side of the boiler, a pipe connecting the water jacket of the boiler, and a pipe connecting the steam collecting space of the latter, respectively, to the said heat distributing and hot water accumulating source, and pipe connections leading from the latter to the steam circulating piping system extending through the house, substantially as shown and described.

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