March 5, 1935. R. WALKER ET AL 1,993,725

GAS FIRED BOILER

Filed Nov. 21, 1934 2 Sheets-Sheet 1

Fig. 1.

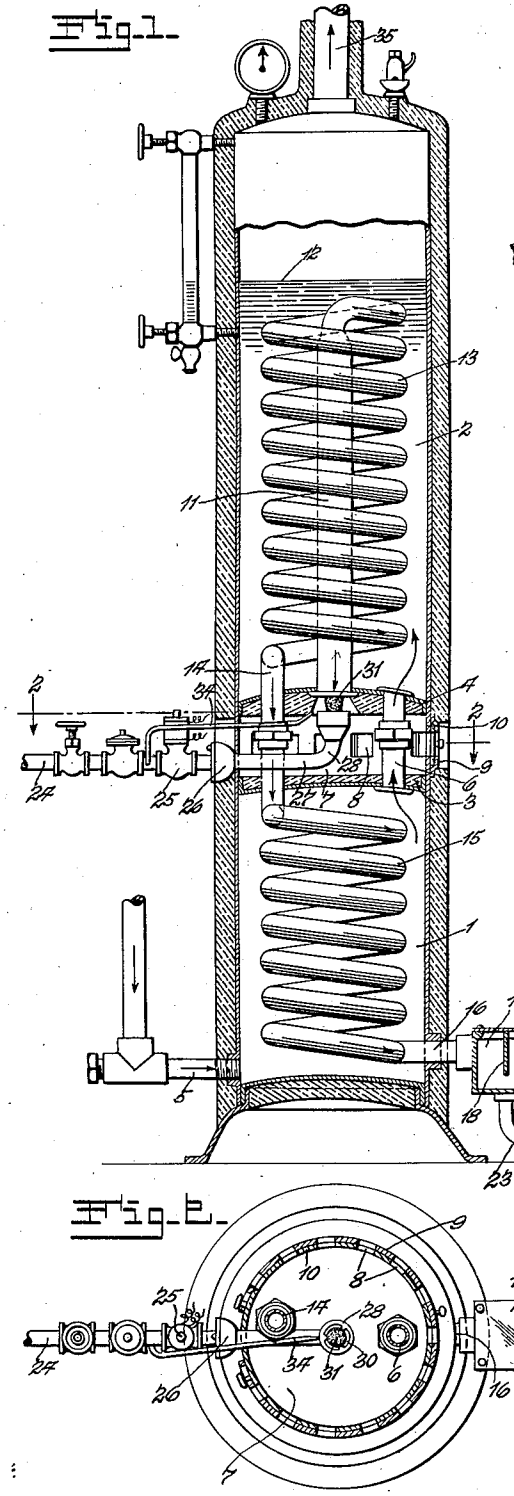


Fig. 3.

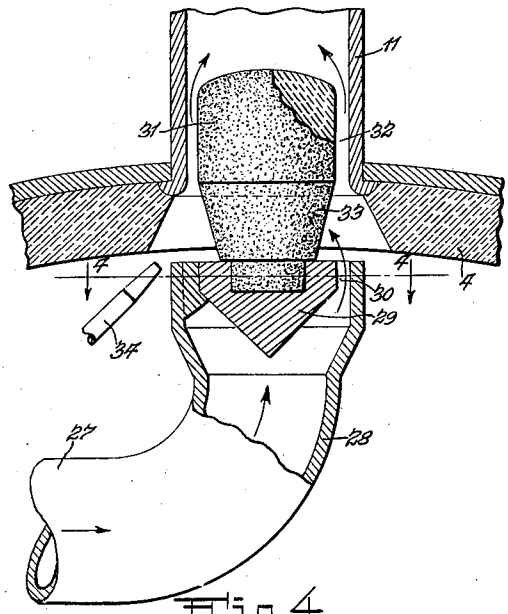


Fig. 4.

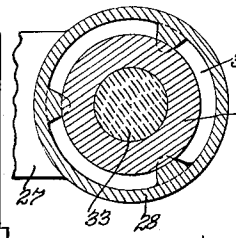


Fig. 10.

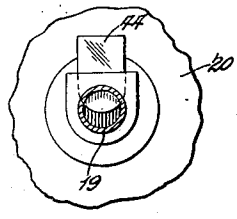


Fig. 2.

Inventors
Raymond Walker
John J. Wolfersperger
by Rippey & Kingsland
Their Attorneys.

March 5, 1935. R. WALKER ET AL 1,993,725

GAS FIRED BOILER

Filed Nov. 21, 1934 2 Sheets-Sheet 2

Fig. 6.

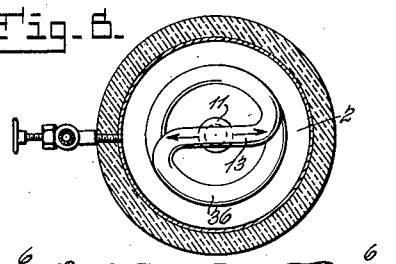


Fig. 9.

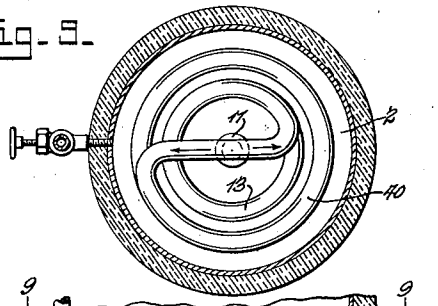


Fig. 5.

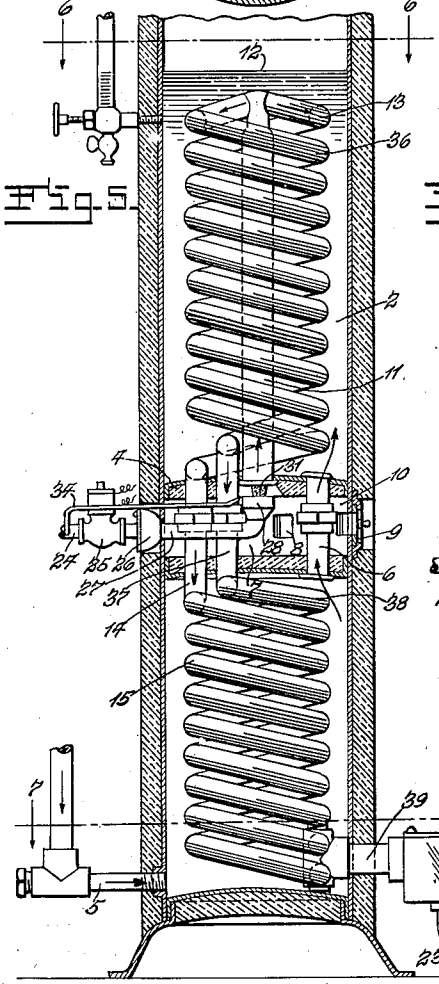


Fig. 8.

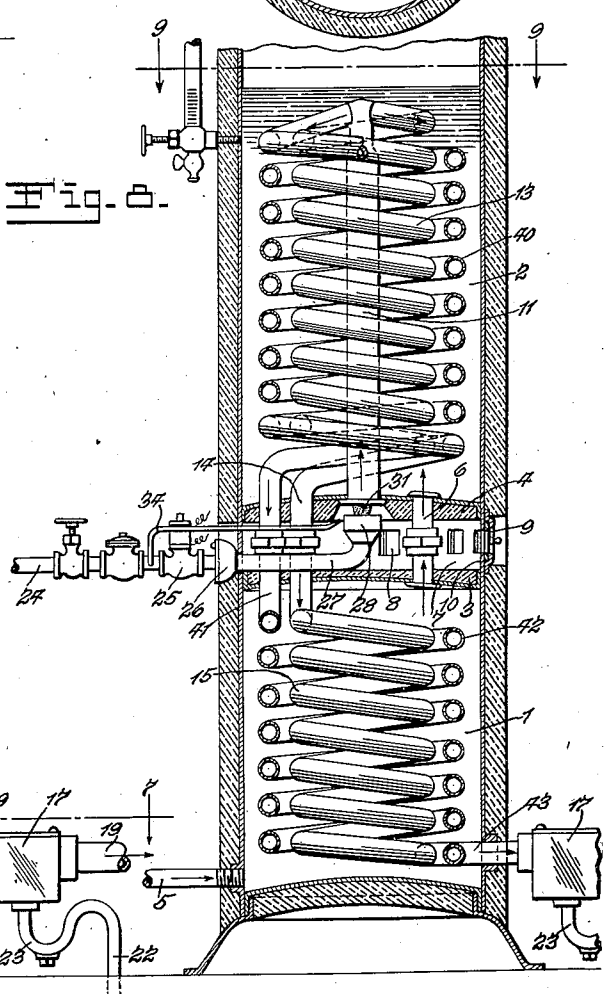
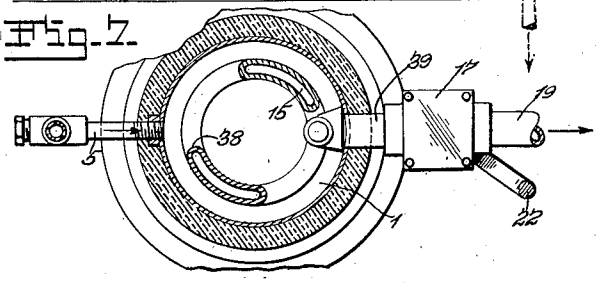


Fig. 7.



Inventors
Raymond Walker
John J. Wolfersperger
by Pippey & Kingsland
their Attorneys.

Patented Mar. 5, 1935 1,993,725

UNITED STATES PATENT OFFICE

1,993,725

GAS FIRED BOILER

Raymond Walker, St. Louis, and John J. Wolfersperger, Webster Groves, Mo.

Application November 21, 1934, Serial No. 754,004

6 Claims. (Cl. 122—45)

This invention relates to a gas fired boiler.

Objects of the invention are to provide an improved boiler utilizing gas as a fuel and having a compartment receiving feed water and a separate compartment in communication therewith receiving the water from the water compartment, in combination with a spiral combustion chamber mounted in said second compartment and extending downwardly and through the first compartment to preheat the feed water; to provide improved means for controlling the air supply to the combustion device and combustion chamber to obtain more perfect combustion; to arrange the combustion chamber in such a way that the most intense heat is almost immediately transferred approximately to the surface of the water and near the steam or hot water outlet from the heating chamber; and to provide improved means for separating the water vapor and acids from the flue gases.

Other objects will be readily apparent from the following description, reference being made to annexed drawings, in which—

Fig. 1 is a vertical sectional view of one desirable embodiment of the invention.

Fig. 2 is a cross sectional view on the line 2—2 of Fig. 1.

Fig. 3 is an enlarged vertical sectional view of the burner and the lower portion of the combustion chamber.

Fig. 4 is a cross sectional view on the line 4—4 of Fig. 3.

Fig. 5 is a vertical sectional view showing a variation in the arrangement of the combustion devices.

Fig. 6 is a cross sectional view on the line 6—6 of Fig. 5.

Fig. 7 is a cross sectional view on the line 7—7 of Fig. 5.

Fig. 8 is a sectional view showing another variation of the combustion chamber and the heat transfer devices.

Fig. 9 is a cross sectional view on the line 9—9 of Fig. 8.

Fig. 10 is a sectional view on the line 10—10 of Fig. 1 showing the device for controlling and regulating the effective action of the suction device.

The tank is vertically elongated and comprises in its lower portion a feed water compartment 1 and in its upper portion a boiler compartment 2 separated from each other by spaced partition walls 3 and 4. Water is delivered into the feed water compartment 1 through a supply pipe 5 and passes from the boiler compartment 2 through a tube 6.

The partition wall 3 forms the upper end wall of the compartment 1 and the partition wall 4 forms the bottom wall of the boiler compartment 2. The walls 3 and 4 are separated by an intervening space 7 into which air is admitted through openings 8. If desired, a member 9 may be mounted around the wall having the openings 8 and provided with openings in registration with said openings 8, as shown.

A combustion chamber tube 11 opens downwardly through the center of the wall 4 and extends upwardly in the compartment 2 nearly to the upper surface 12 of the water in the compartment 2. The upper end of the tube 11 is connected with and opens into a spiral tube 13 of less diameter than the tube 11 and which is coiled about and spaced relatively a considerable distance from said tube 11. The lower end of the spiral tube 13 has an extension 14 through the walls 4 and 3 and is continuous downwardly through the compartment 1 as a spiral tube portion 15. The lower end of the spiral tubular portion 15 continues as a discharge pipe 16 opening through the wall of the compartment 1 into a closed compartment 17 having a downwardly extended baffle wall 18 in connection with the upper wall thereof. A pipe 19 has one end opening into the compartment 17 and the opposite end into a fan or blower mechanism 20 of a known commercial and available type and which discharges into an outlet pipe 21. A drain pipe 22 formed with a trap 23 opens into the compartment 17 for discharging the condensate therefrom. A gas supply pipe 24, equipped with a known electrically controlled valve 25, discharges gas into an air mixer 26 on the outer end of the tube 27 mounted in the space 7, the air mixer 26 being outside of said space 7. The tube 27 is provided with an upwardly extended portion 28 at its inner end immediately below and in axial alinement with the open lower end of the tube 11. A spreader 29 is supported in the open upper end of the curved tubular portion 28 and forms an annular space 30 through which gas emerges for combustion. A cylindrical body 31 of refractory material is enclosed within the lower end of the tube 11 and cooperates with said tube to form an annular space 32. A downwardly tapered lower end portion 33, in connection with the body 31, is engaged with and supported by the spreader 29. A pilot light device, comprising a tube 34, has one end opening into the gas supply pipe 24 outwardly beyond the valve 25 and its inner end ter-

minating adjacent to the space 30. A constantly burning pilot light is maintained at the inner end of the tube 34, so that when the valve 25 is opened to admit gas to the pipe 27, said gas will be ignited at the annular space 30 and the flames and products of combustion will rise through the space 32 into the tube 11. An outlet or withdrawal pipe 35 opens from the upper end of the compartment 2 for the withdrawal of steam or hot water from said compartment. It will be understood that the opening of the valve 25 to admit gas to the burner structure at the inner end of the pipe 27 is controlled automatically by known mechanism, which it is not necessary to illustrate or described in detail.

The invention as illustrated in Figs. 5, 6 and 7 is the same as that above described with an additional part forming a part of the heating device. The same reference numerals that are applied to the parts above described are applied to analogous parts in Figs. 5, 6 and 7. The heating device shown in Figs. 5, 6 and 7 includes an additional coiled tubular part 36 opening from the upper end of the tube 11 and coiling downwardly between the coils of the tubular part 13 and having an extension 37 through the walls 4 and 3 connecting with a similar tubular portion 38 between the coils 15 in the compartment 1. The lower ends of the coiled portions 15 and 16 open into an outlet manifold 39, discharging into the compartment 17.

The heating device shown in Figs. 8 and 9 differs from that shown in Fig. 1 only in providing an additional coil 40 opening from the upper end of the tube 11 and coiling about the coils 13 and provided with an extended portion 41 through the walls 4 and 3 and connecting with a coil 42 in the compartment 1 about the coiled tubular portion 15. The lower ends of the coiled tubular portions 15 and 42 communicate with a manifold 43 that opens into the compartment 17.

A slide valve 44 is mounted in the pipe 19 and may be placed in different adjusted positions in order to vary the size of the opening or passage through said pipe and consequently vary the effect of the fan or blower mechanism 20. When the valve 44 is entirely open, a strong suction will be maintained and an increased amount of air drawn through the openings 8 into the combustion space 7 and through the heating device.

Obviously the invention may be varied in other particulars in order to obtain maximum transfer of heat from the heating device to the water and to preheat the feed water before the feed water is delivered into the heating compartment. Also, the invention may be varied in other particulars in order to control the air supply to the combustion device under operation of the suction mechanism which operates to draw the heated air and products of combustion into and through the heating devices, and to cause a condensation of the acid carrying vapor and to separate the condensate from the flue gases. The invention may be also varied in other particulars without departure from the nature and principle thereof.

We claim:

1. A device of the character described comprising a tank, two partitions in said tank separated by an intervening space and dividing the tank into a feed water compartment at the lower end of the tank and a boiler compartment at the upper end of the tank, a tortuous tubular heating device in said boiler compartment and having its lower end opening into said space, said heating device extending through said partitions and being coiled in said feed water compartment, a burner mounted in said space below the open end of said heating device, means for supplying gas to said burner, and mechanism for creating suction through said heating device.

2. A device of the character described comprising a tank, two partitions in said tank separated by an intervening space and dividing the tank into a feed water compartment at the lower end of the tank and a boiler compartment at the upper end of the tank, a tortuous tubular heating device in said boiler compartment and having its lower end opening into said space, said heating device extending through said partitions and being coiled in and opening from said feed water compartment, means for admitting water into said feed water compartment, means forming an open passage from said feed water compartment to said boiler compartment, a gas burner mounted in said space adjacent to the open end of said heating device, means for creating a suction through said heating device, and means for controlling the effective operation of said suction means.

3. A device of the character described comprising a tank having a feed water compartment at its lower end and a boiler compartment at its upper end, partitions between said compartments and separated by an intervening space, a coiled heating device mounted in said compartments and having one end opening into said space and the opposite end extending outwardly from said feed water compartment, a burner mounted in said space below the open end of said heating device, and means for maintaining an annular flame at said burner and in the open end of said heating device.

4. A device of the character described comprising a tank having a feed water compartment at its lower end and a boiler compartment at its upper end, partitions between said compartments and separated by an intervening space, a coiled heating device mounted in said compartments and having one end opening into said space and the opposite end extending outwardly from said feed water compartment, a burner mounted in said space below the open end of said heating device, means for maintaining an annular flame at said burner and in the open end of said heating device, means for conducting water from said feed water compartment to said boiler compartment, and means for creating a controlled suction through said heating device.

5. A device of the character described comprising a tank, two partitions in said tank separated by an intervening space and dividing the tank into a boiler compartment at the upper end and a feed water compartment at the lower end, means for conducting water from said feed water compartment to said boiler compartment, a spiral heating device mounted in said compartments and having a heat receiving end opening into said space and a discharge end opening from said feed water compartment, means for maintaining an annular flame at the open end of said heating device in said space, and means for separating condensate from the products of combustion.

6. A device of the character described comprising a tank, partitions separated by an intervening space and dividing said tank into a feed water compartment at the lower end and a boiler compartment at the upper end, means for conducting water from said feed water compartment to said boiler compartment, a tube opening into said

space and extending upwardly into said boiler compartment, a number of spirally coiled tubes opening from the upper end of said first named tube and extending downwardly into and through said feed water compartment, an extension from the lower end of said last named tubes for conducting the products of combustion therefrom, a device in connection with said extension receiving and discharging condensate apart from the gases, and a device for creating suction through said tubes and for discharging the gases away from the condensate.

RAYMOND WALKER.
JOHN J. WOLFERSPERGER.