July 16, 1935. C. C. RAMSDELL ET AL 2,008,155

WATER HEATING APPARATUS

Filed Aug. 3, 1932

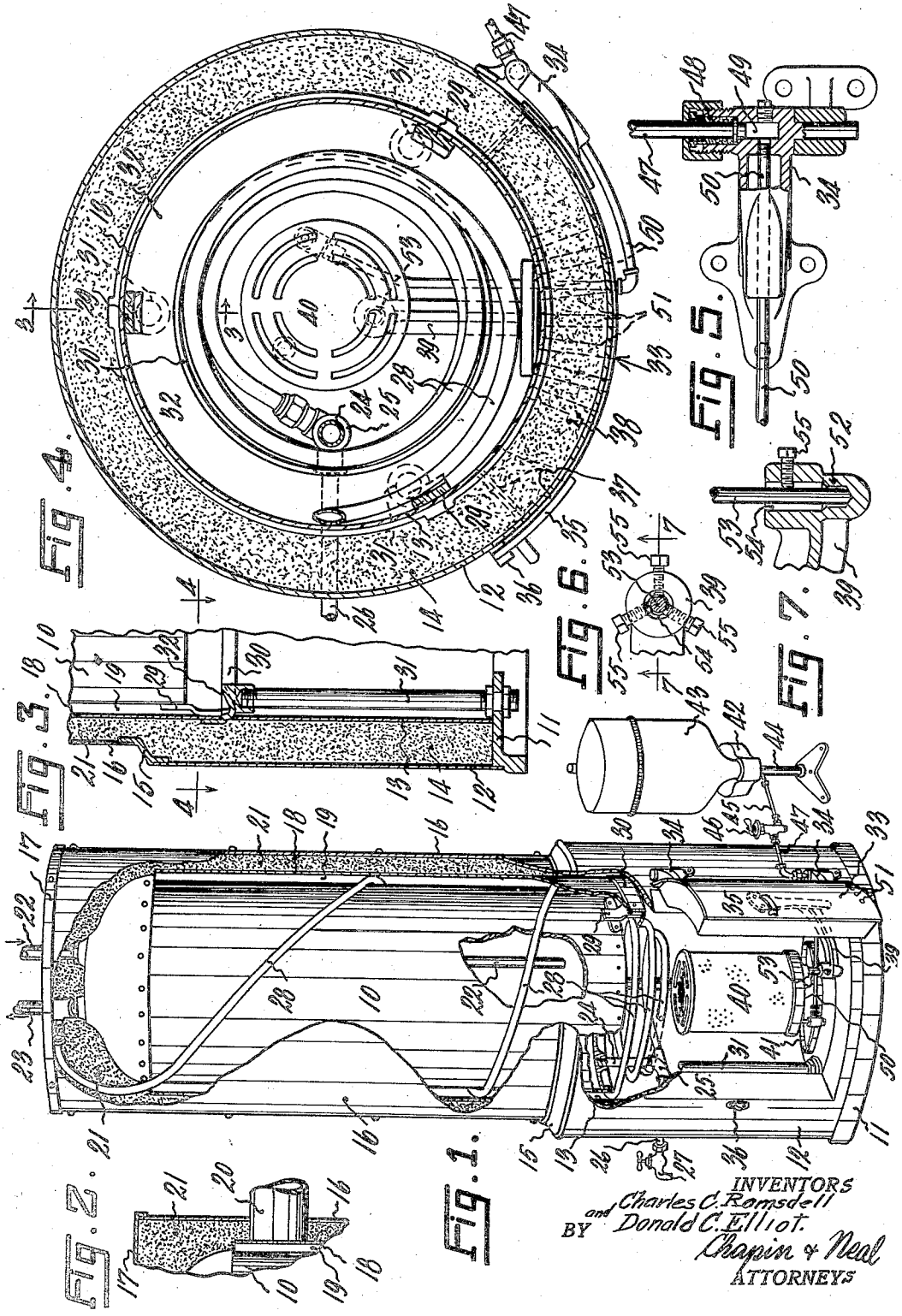

Fig. 1.

Fig. 4.

Fig. 3.

Fig. 2.

Fig. 5.

Fig. 6.

Fig. 7.

INVENTORS
Charles C. Ramsdell
and Donald C. Elliot.
BY Chapin & Neal
ATTORNEYS

Patented July 16, 1935

2,008,155

UNITED STATES PATENT OFFICE

2,008,155

WATER HEATING APPARATUS

Charles C. Ramsdell, Springfield, and Donald C. Elliot, West Springfield, Mass., assignors to Gilbert & Barker Manufacturing Company, West Springfield, Mass., a corporation of Massachusetts

Application August 3, 1932, Serial No. 627,308

5 Claims. (Cl. 122—19)

This invention relates to improvements in water heating apparatus.

The improvements of this invention are directed to apparatus of the same general type as disclosed in the John F. Barker Patent No. 1,089,813, granted March 10, 1914. As therein shown, a water tank, of the type known as a "kitchen boiler", is encompassed by an insulated casing, leaving an annular space between the casing and boiler, which serves as a flue to carry off the products of combustion from an oil or other form of burner, placed beneath and heating the base of the tank.

The general objects of the invention are to provide a generally improved apparatus of the general type defined; to provide means for securing greatly improved operating efficiency, whereby a much larger percentage of the heat units in the fuel consumed are utilized in raising the temperature of the water; and to incorporate into the apparatus means by which it is made quickly responsive, whereby hot water in limited volume is quickly available.

These and other objects will best appear as the detailed description proceeds and will be pointed out in the appended claims.

The invention will be disclosed with reference to the accompanying drawing, in which,

Fig. 1 is a perspective view, partly in section, of the apparatus;

Figs. 2 and 3 are fragmentary sectional elevational views of the upper and lower portions, respectively, of the apparatus;

Fig. 4 is a sectional plan view, taken on the line 4—4 of Fig. 3;

Fig. 5 is a sectional view of one of the door hinges, showing the oil feed connections therewith;

Fig. 6 is a fragmentary plan view of the burner support showing the levelling means for the burner; and

Fig. 7 is a sectional view taken on the line 7—7 of Fig. 6.

Referring to Fig. 1 of the drawing, a cylindrical tank 10, such as an ordinary "kitchen boiler", is mounted with its axis vertically disposed within an insulated casing. Such casing (see also Fig. 3) consists of a base 11, supporting outer and inner cylindrical shells 12 and 13, respectively, the space between these shells being filled with heat insulating material 14. Surmounting the outer shell 12 is a ring 15 upon which is mounted a second outer shell 16 of smaller diameter. The top of shell 16 is closed by a cap 17. Within shell 16 is an inner shell 18 of about the same diameter as the shell 13 and of a diameter somewhat larger than that of tank 10, whereby an annular flue 19 is formed between the shell 18 and tank. This shell 18 extends only to the dome of tank 10 and, near its upper end, is connected to a radial outlet pipe 20 (see Fig. 2). The space between shells 16 and 18 and the space between the cap 17 and the dome of tank 10 is packed with heat insulating material 21.

Cold water is supplied to tank 10 by way of a pipe 22, which enters the upper end of the tank and extends downwardly therein to a point only a few inches above the bottom of the tank. Hot water is drawn from the tank by way of a pipe 23, connected to the upper end thereof. A pipe 24 extends vertically downwardly for a short distance from the bottom of the tank and connects with a special fitting 25, to one outlet of which a pipe 26 is connected. Pipe 26 extends outwardly through shells 12 and 13 and at its outer end is provided with a faucet 27, which, when opened, allows any sediment collecting in the lower portion of the coil 28 as well as in the bottom of the tank to be drawn off. To the other branch of fitting 25, a tube 28 is connected and this is wound in spiral form with several convolutions disposed beneath the base of tank 10 and other convolutions wrapped around the periphery of the tank and disposed in the flue 19. This tube 28 closely fits the inner shell 18 and the outer wall of tank 10 and forms a baffle for the flue 19. The upper end of tube 28 is connected to pipe 23. The tube 28 also serves to conduct cooler water from the base of tank 10 in a path such as to be heated by the burner to be described and eventually delivered to the upper end of the tank.

The tank 10 is supported by three legs 29 (shown in plan section in Fig. 4 and one of which is shown in elevation in Fig. 3). These legs are secured at their upper ends to tank 10 and their lower ends rest upon a ring 30, which is supported by columns 31 from the base 11. This ring 30, which also serves to support shell 18, is provided with a channel 32 in its upper face to receive and collect any condensation drippings falling from the rim of tank 10, which rim it underlies.

The lower and larger section of the casing is provided with a door 33, supported by hinges 34 and provided with a latching handle 35 for engagement in a catch 36, fixed to shell 12. This door, like the casing, has a metallic shell 37 (Fig. 4) filled with insulating material 38. Fixed to the inner face of the door is a bracket 39, which supports a burner 40 of the well known perforated

combustion tube type. Beneath the burner and resting on the floor is a drip pan 41 (Fig. 1). When the door is opened, the burner 40 may be swung completely out of the casing for convenient inspection, adjustment or repair. Normally, it lies in substantially centralized relation within the heat insulated casing and below the bottom of tank 10.

Fuel is supplied to the burner in any suitable way. As shown, a constant level reservoir 42, supplied with oil from an inverted bottle 43, is provided,—both these elements being supported from a floor stand 44. Oil is conveyed from reservoir 42 by a pipe 45 to a valve 46 and thence by a pipe 47, which enters the upper end of the lower hinge in an axial direction through a suitable stuffing box 48. This hinge has a chamber 49 which receives the oil from pipe 47 and from which the oil is delivered to a pipe 50. The latter passes through the door and is connected to the burner as indicated.

A number of holes 51 are provided in door 33 near its lower edge to admit the necessary air supply for burner 40. The oil pipe 50 is arranged above these holes and in the path of the entering air, whereby the oil pipe is kept cool.

For levelling up the burner, the adjustable mounting shown in Fig. 7 is provided. The free end of bracket 35 has a vertical socket 52 formed therein to receive the standard 53 of burner 40. The upper part 54 of this socket is counterbored to a larger diameter and passing through the wall of such portion are three set screws 55, the inner ends of which bear against the standard 53. The lower end of the standard may have a hemispherical end which rests in the base of socket 52. The standard 53 fits loosely in this socket and can be moved within a sufficient range by adjustment of the set screws 55 to level up the base of burner 40.

It will be understood by those skilled in the art that any suitable kind of burner may be used in the apparatus described and that there are available in the market various appliances, whereby the burner may be automatically lighted and whereby the starting and stopping of the burner may be made responsive to the temperature of the water in tank 10. Accordingly, these appliances, being old and well known in the art, have not been illustrated but it will be understood that they may be used, if and when desired.

In operation, the burner may be lighted manually by swinging open the door 33 or it may have, as above described, automatic lighting provisions as well as provisions, whereby the burner will automatically start up, whenever the need for it occurs. When door 33 is closed, the burner underlies and heats the base of tank 10 in the same general manner as disclosed in the aforesaid patent. In addition, the heat from the burner is applied to the coil 28, and the cooler water taken from the base of the tank and passing through this coil is quickly heated and delivered to the upper part of the tank, or as shown to the hot water service pipe. In this way, the old form of apparatus is made quickly responsive and given, in part at least, the characteristics of an instantaneous heater. The coil also promotes a rapid circulation of water from the bottom to the top of the tank 10 and expedites the heating of its contents. In addition, the free circulation of water thus secured reduces the likelihood of the formation and deposit of sediment in the tank and coil. This coil also serves as a baffle in the annular flue of the apparatus and retards the passage of the products of combustion therethrough. The gases are made to travel around the tank 10 in a path of considerable length, whereby to effectively utilize the heat therefrom for useful work in raising the temperature of the water.

The coil 28, as will be clear from the drawing, is so disposed that the greater part of its length is located near the lower part of the apparatus. A substantial part of the coil is subjected to the heat of the burner to secure the quick heating feature. The remainder acts as a baffle and its convolutions are of varying pitch, increasing more and more rapidly in the direction of upward travel. The arrangement provides for the maximum heat exchange between the flue gases and the water in tank 10 at the location where it is most needed. The hottest gases are at the base of the flue and the coldest water is at the base of the tank. As the gases travel upward they become cooler and cooler and the water in tank 10 becomes hotter and hotter until a point is reached where the gases can no longer liberate any heat to the water. At this point the outlet 20 is located. If the gases traveled any higher, they would be taking heat from the water in the tank, which of course is not desired.

As an example, on a test of an apparatus of the type disclosed, the temperature of 25 gallons of water was raised from 60° Fahr. to 140° Fahr. in one hour with a fuel consumption of one and one-half pints of range oil. A small amount of hot water was very quickly available and in fifteen minutes four gallons of hot water was available. The effective utilization of the heat from the burner is evidenced by the fact that the exhaust gases were no more than ten degrees hotter than the water in the upper portion of the tank. The test showed the high operating efficiency of eighty per cent,—that is, eighty per cent of the heat units in the oil consumed were absorbed by the water.

Thus we have provided an improved water heating system of high operating efficiency with provisions for quickly heating small volumes of water to secure the desirable instantaneous feature.

What we claim is:

1. A hot water heating apparatus, comprising, a tank, a heat insulating casing surrounding the tank in spaced concentrical relation therewith leaving an annular passage therebetween, a burner below the tank and within the lower part of said casing, said passage having an outlet through the casing near its upper end and serving as a flue to carry away the products of combustion from the burner, and a water coil connected at one end to the lower part of said tank and at the other end to the upper part of said tank, said coil having convolutions disposed below the tank and adjacent the burner and other convolutions wrapped around the tank and closely fitting said passage whereby to retard the passage of the products of combustion in their travel from the burner to said outlet.

2. A hot water heating apparatus, comprising, a tank, a heat insulating casing surrounding the tank in spaced concentrical relation therewith leaving an annular passage therebetween, a burner below the tank and within the lower part of said casing, said passage having an outlet through the casing near its upper end and serving as a flue to carry away the products of combustion

from the burner, and a water coil connected at one end to the lower part of said tank and at the other end to the upper part of said tank, said coil having convolutions disposed below the tank and adjacent the burner and other convolutions wrapped around the tank and closely fitting said passage whereby to retard the passage of the products of combustion in their travel from the burner to said outlet, the convolutions of said coil adjacent the burner having an internal diameter greater than the diameter of the burner to prevent condensation drippings from the coil from entering the burner.

3. A hot water heating apparatus, comprising, a tank, a heat insulating casing surrounding the tank in spaced concentrical relation therewith leaving an annular passage therebetween, a burner below the tank and within the lower part of said casing, said passage having an outlet through the casing near its upper end and serving as a flue to carry away the products of combustion from the burner, and a water coil connected at one end to the lower part of said tank and at the other end to the upper part of said tank, said coil having convolutions disposed below the tank and adjacent the burner and other convolutions wrapped around the tank and closely fitting said passage whereby to retard the passage of the products of combustion in their travel from the burner to said outlet, the convolutions of said coil disposed in said passage being more closely spaced near the lower portion than in the upper portion thereof.

4. A hot water heating apparatus, comprising, a tank, a heat insulating casing surrounding the tank in spaced concentrical relation therewith leaving an annular passage therebetween, a burner below the tank and within the lower part of said casing, said passage having an outlet through the casing near its upper end and serving as a flue to carry away the products of combustion from the burner, and a water coil connected at one end to the lower part of said tank and at the other end to the upper part of said tank, said coil having convolutions disposed below the tank and adjacent the burner and other convolutions wrapped around the tank and closely fitting said passage whereby to retard the passage of the products of combustion in their travel from the burner to said outlet, said outlet located below the top of the tank and at the point where said products are no longer effective to liberate heat to the water in said tank.

5. In a water heating and storage system the combination with a hot water storage tank, of a heating coil connected to the top of said tank extending along the side of the tank and a substantial distance below the tank, a heater below said coil, a pipe connection from the bottom of the tank to a source of water supply, and a housing for said tank and coil, said coil being of greater pitch adjacent the tank than below the said tank.

CHARLES C. RAMSDELL.
DONALD C. ELLIOT.