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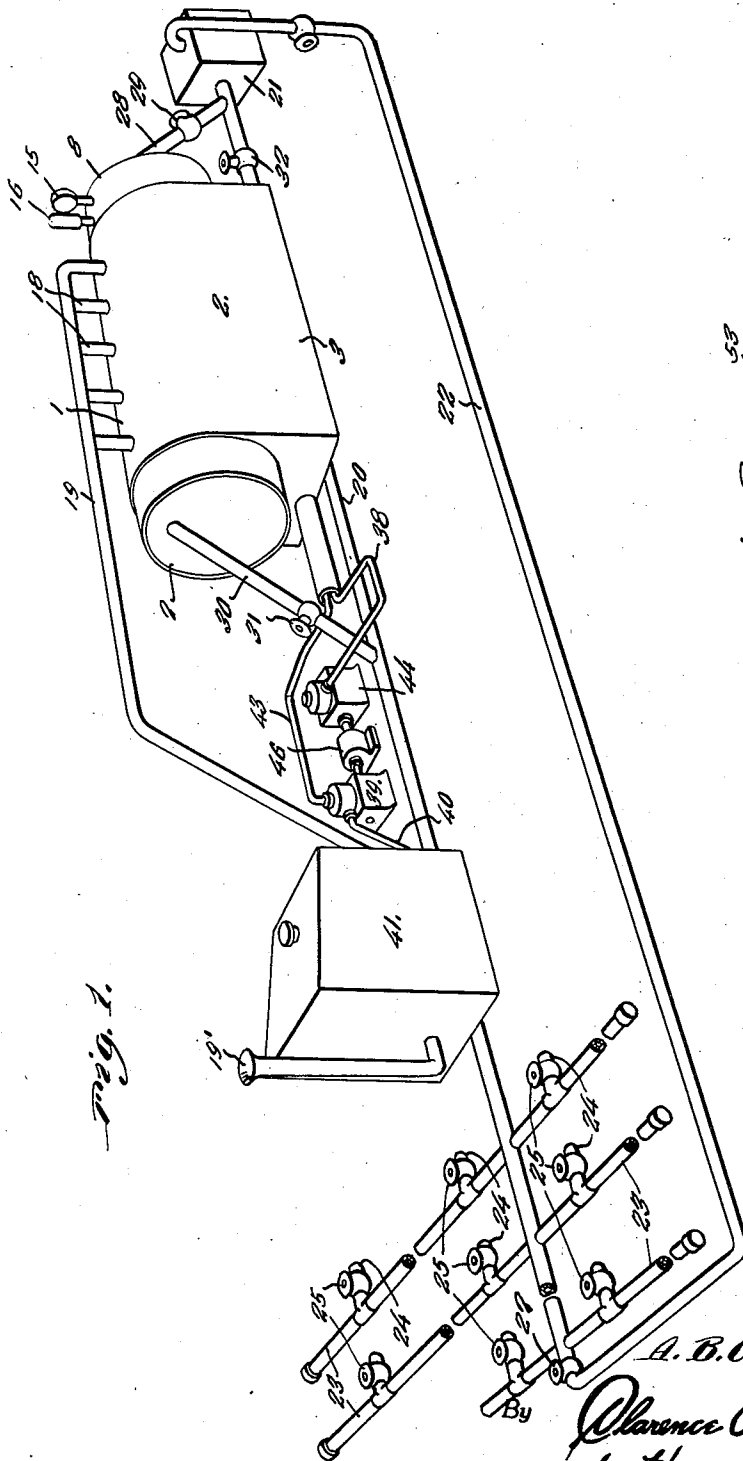
A. B. CARLTON

2,266,162

HEATING AND DISTRIBUTION PLANT

Filed May 17, 1939

4 Sheets-Sheet 1



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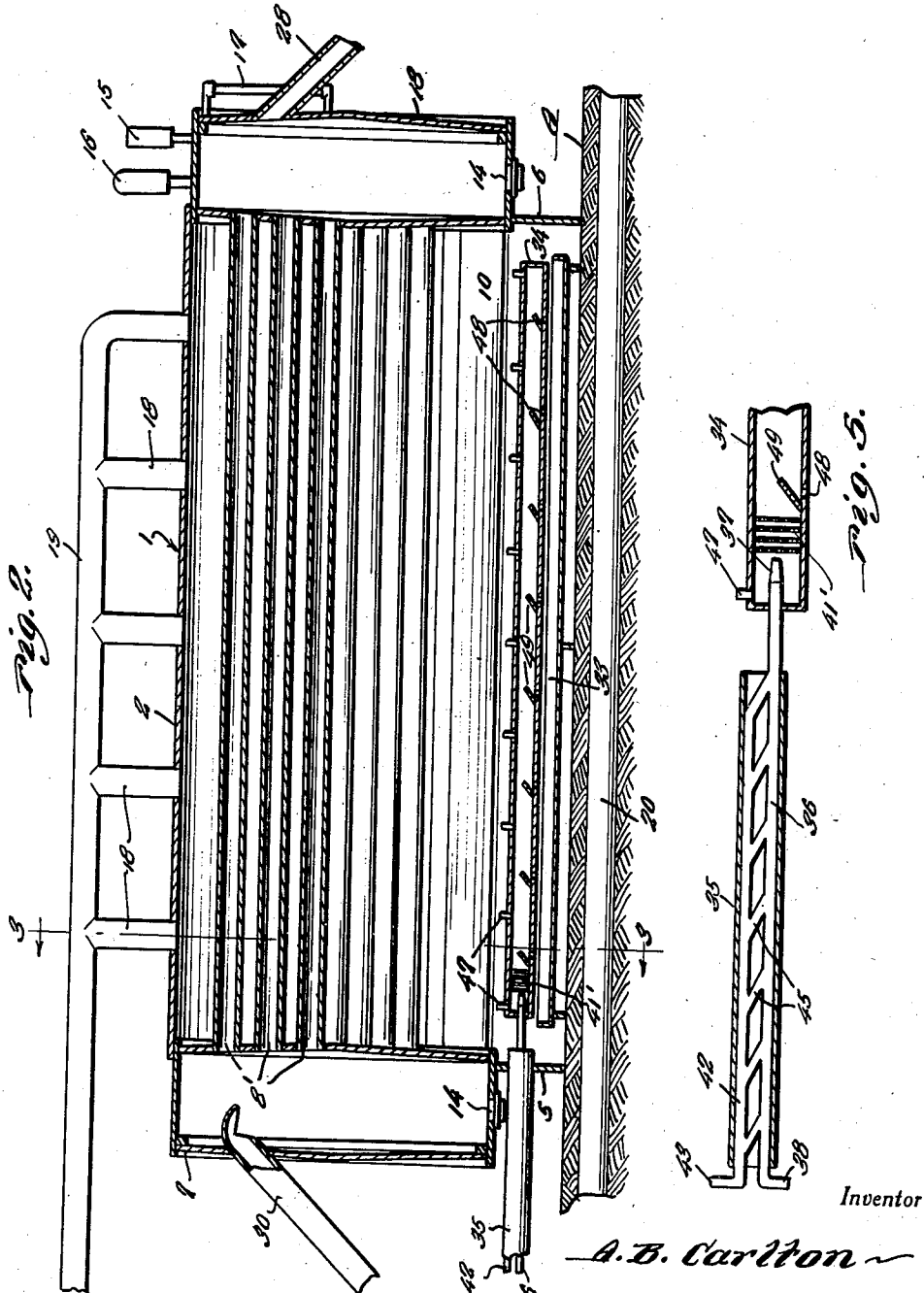
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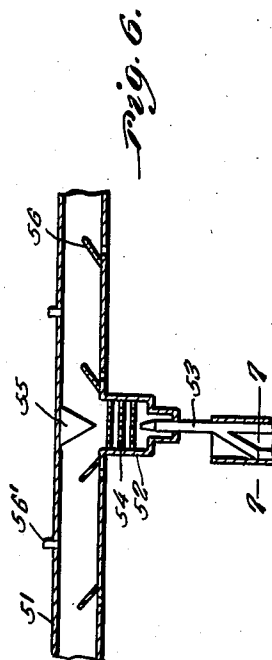
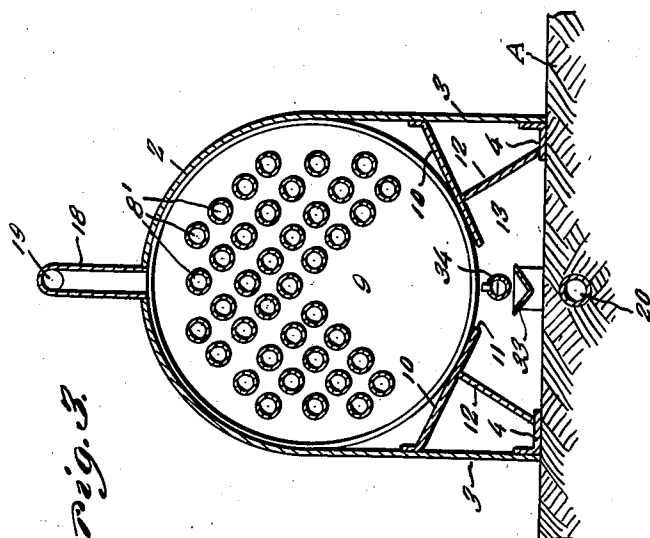
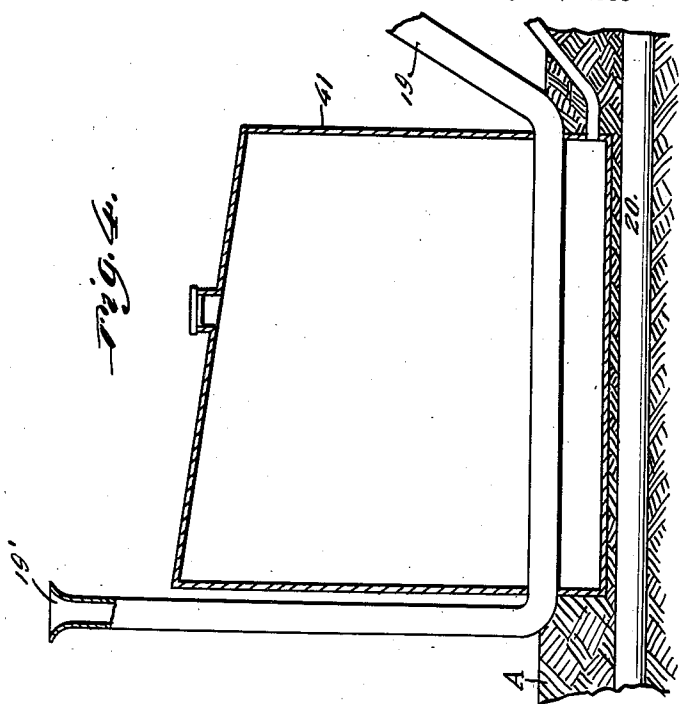
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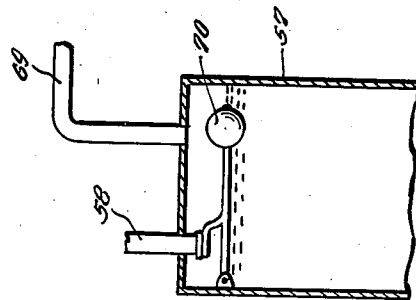
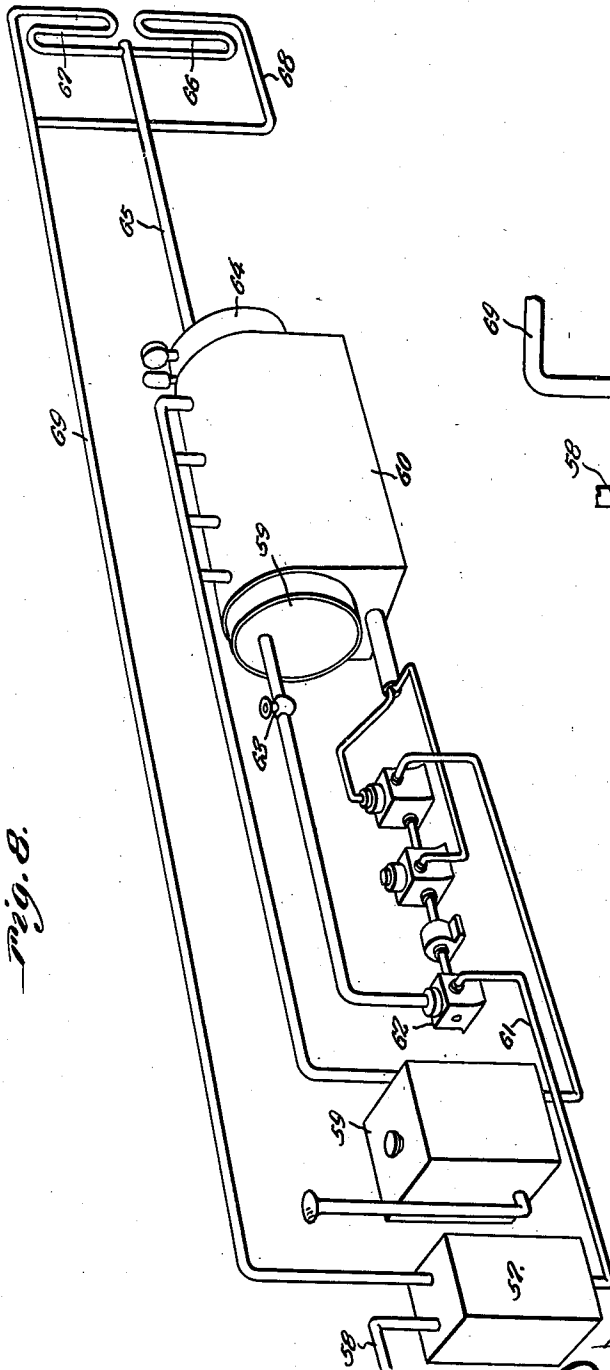
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UNITED STATES PATENT OFFICE

2,266,162

HEATING AND DISTRIBUTION PLANT

Adam B. Carlton, Tampa, Fla.

Application May 17, 1939, Serial No. 274,254

1 Claim. (Cl. 122-264)

My invention relates to improvements in water heating and distribution plants.

The invention is designed with the particular purpose in view of providing an efficient, outdoor plant for heating water and conveying the same under pressure, and preferably under ground to diverse and remote points for underground release and at selected locations to saturate the ground in orchards, groves, nurseries, and the like with heater water deposited in pools or not as desired as a protection against frost and freezing.

Another object is to provide a plant of the character and for the purpose above set forth which is adapted for converting into an indoor domestic heating system.

Still another object is to provide improved oil burning equipment for heating the water, the improvements in this respect being particularly directed to proper carburation of the fuel oil and preheating the same.

Other objects, more or less subordinate in character, are also comprehended by my invention, all of which together with the precise nature of my improvement will be readily understood when the succeeding description and claim are read with reference to the drawings accompanying and forming part of this specification.

In said drawings,

Figure 1 is a view in perspective of a preferred embodiment of my invention.

Figure 2 is a fragmentary view in longitudinal vertical section taken through the boiler and appurtenant parts and drawn to an enlarged scale.

Figure 3 is a view in transverse section taken on the line 3-3 of Figure 2 looking in the direction indicated by the arrows.

Figure 4 is a view in vertical longitudinal section taken through the fuel tank.

Figure 5 is a view in longitudinal section taken through the burner and parts appurtenant thereto.

Figure 6 is a view in vertical longitudinal section of a modification of the burner.

Figure 7 is a view in transverse section taken on the line 7-7 of Figure 6 and drawn to an enlarged scale.

Figure 8 is a view in perspective of a modified embodiment of the plant, and

Figure 9 is a fragmentary view in vertical section of the water storage tank of the modified plant shown in Figure 8.

Describing now my invention in detail, with reference to the drawings by numerals, in the

preferred embodiment thereof, as shown in Figures 1 to 7, the plant of my invention comprises as a basic unit a boiler 1 including an elongated transversely arched shell 2 having straight sides 3 and internal reinforcing angle bars 4 extending along the bottom edges thereof providing base supporting structure for the shell. The shell 2 is closed at its ends by front and rear crown sheets 5 and 6 and a pair of circular drum-like front and rear outlet and inlet headers 7 and 8, respectively, spaced above the bottom of the shell 2. Extending between the headers 7 and 8 with their opposite ends suitably secured in the inner side walls thereof is an assembly of parallel, horizontal water heating pipes 8' laterally spaced, the outer pipes of the assembly being spaced from the shell 2 and said pipes being arranged on the under side of the assembly to form a transverse arch 9 extending throughout the assembly all for the purpose of facilitating the passage of heat around and through the assembly. The shell 2 is provided with a false bottom, beneath the headers 7 and 8 comprising a pair of horizontal plates 10 extending inwardly and downwardly along the sides 3 of the shell 2 at a slight inclination and forming therebetween in the longitudinal center of the shell 2 a narrow heat inlet 11. A pair of upwardly convergent plates 12 extending from the bars 4 to said plates 10 form together with the latter a burner pit 13 in the bottom of the shell 2 extending from end to end of the latter and functioning as a combustion chamber. The headers 7, 8 are provided with bottom drain plugs 14 and the inlet header 8 with a pressure gage 15, a safety valve 16 and a water level gage 17. At the top of the shell 2 is a plurality of upstanding heat discharge flues 18 spaced apart longitudinally of the shell and communicating with a heat discharge manifold pipe 19 extending forwardly from the boiler 1 and presently referred to in detail.

The described boiler 1 is designed to be set up, in the preferred embodiment of the invention on the ground, represented at A, and over an underground main water supply line 20 extending longitudinally of the boiler and preferably centered below the same. The line 20 is connected at a suitable distance from the rear end of the boiler 1 to a water storage tank 21 which may be sunk in the ground A, or not, as desired, and to which water may be fed, under pressure, from any suitable source of supply, not shown. The line 20 is designed to extend for any desired distance beyond the front end of

the boiler 2 and preferably to terminate in a lateral branch of a return line 22 leading to the top of the tank 21. Adjacent the terminal, front end, of said line 20 is a distributing assembly of laterally extending pipes 23 on opposite sides of said line 20 and which are designed to be extended for any desired distance preferably underground to remote points. The pipes 23 may extend in a straight line, or not, as desired. Spaced along said pipes 23 at suitable intervals are distributing taps 24 laterally extending and of T form with distributing valves 25 therein. A valve 27 is interposed in the line 20 immediately in front of the described distributing assembly to cut off flow through the return line 22, which line may be eliminated if desired.

A supply branch, feed pipe 28 extends upwardly and forwardly from the main supply line 20 at the rear of the boiler 1 to the upper part of the rear header 8 with a cutoff valve 29 interposed therein. A similar outlet pipe 30 extends downwardly from the upper front part of the front header 7 to said line 20 with a cutoff valve 31 interposed therein. Intermediate the feed pipe 28 and the boiler 1 is a cutoff valve 32 provided in the line 20 and which, when closed, provides for bypassing the water from the line 20 through the boiler 1 back to said line 20 to flow there-through to the distributing assembly of pipe 23.

Coming now to the heater features, in the longitudinal center of the pit 13, and disposed on the ground, is a suitably supported trough 33 forming a drip catching and heating pan for waste oil. Spaced slightly above the trough 33 and extending parallel therewith is a tubular burner 34 closed at its front and rear ends. The burner 34 is supported immediately below the inlet 11 in a manner presently explained. Extending forwardly and horizontally from the front crown sheet 5 of the shell 2 is a tubular air manifold 35 for admitting atmospheric air into the pit 13. Extending into the manifold 35 along the bottom of the same is a smaller fuel injector tube 36 projecting out of the inner end of manifold 35 and terminating in an ejector nozzle 37. The nozzle end of said tube 36 extends into and is suitably fixed in the front end of the burner 34 so as to support the same. The injector tube 36 forms part of a fuel supply line 43 leading from the compression side of a suitable fuel pump 39, the suction side of which is connected by a pipe 40 to the bottom of a fuel supply tank 41 for oil or other fuel.

Extending into the manifold 35 parallel with and spaced above the injector tube 36 is a small fuel injector tube 42 forming part of an air line 43 extending from an air compressor 44. The fuel injector tube 42, within the manifold 35, is connected to the air injector tube 36 by means of a plurality of branches 45 extending downwardly and rearwardly therefrom and preferably equidistantly spaced along said tubes.

The fuel pump 39, fuel supply tank 41, and air compressor 44, are preferably arranged in line in front of the boiler 1 on the surface of the ground and intermediate said pump and compressor is a suitable operating motor 46 therefor.

The burner 34 is provided at the top thereof with a plurality of longitudinally and equidistantly spaced upstanding burner jets 47 and at the bottom thereof with similarly spaced small ports 48 alternating with said jets 47. In advance of the ports 48, said burner is provided with upwardly and rearwardly inclining short baffles 49. Any suitable type of electric ignition,

not shown, for lighting the burner jets 47 may be provided. Within the burner immediately in front of the nozzle 37 is a plurality of vertical laterally spaced, foraminous plates 41' for breaking up the fuel.

The operation of the embodiment of the invention described in the foregoing will be readily understood. When it is desired to distribute heated water in the ground of the orchard, nursery, or other field of operation, the valves 27 and 32 are closed, the valves 29 and 25 opened and the motor 46 started. Under these conditions, the water from the supply tank 1, under pressure, fills the header 8 and pipes 8' and header 7. The fuel is pumped from the fuel supply tank 41 by the pump 39 through the fuel supply line 43 and mixed with air from air line 38 and air injector tube 36 into the burner 34. In its passage through the injector tube 36 said fuel is mixed with the air under compression from the compressor 44 which enters said injector tube 36 by way of the air line 38, fuel injector tube 42, and branches 45. This mixing of the fuel, and air, both under pressure, causes the fuel to be atomized as it issues out of said tube 36 and is discharged into the burner 34 through the plates 41'. The burner jets 47 now being lit, the water in the boiler is heated by way of the heat arising through the inlet 11 against the described assembly of water heating pipes 8'. The heat rising through said assembly of pipes 8' escapes from the shell 2 by way of the discharge flues 18 into the discharge manifold pipe 19. Preferably said manifold pipe 19 is extended through the bottom of the fuel supply tank 41 to terminate exteriorly thereof in an upstanding discharge end 19'. Thus the discharged heat and products of combustion from the shell 2 are utilized to heat the oil, or other fuel, in said tank 41. The plates 41' and baffles 49 in the burner 34 function to break up the particles of oil in the burner 34 and facilitate combustion. Any condensation of oil accumulating in the burner 34 gravitates out of the ports 48 into the trough 33 which serves to catch waste oil. The water in the boiler 1 having been heated to the required temperature as shown by the gage 15, the valve 31 is opened to permit the water to discharge from the header 7 back into the line 20 and to flow to the pipes 23 of the distribution assembly. Obviously, by selectively opening valves 25, the heated water may be discharged through the corresponding taps 24 and the ground saturated or pools filled with heated water at selected locations. The return line 22 may be utilized, valves 25 being closed, and valve 27 opened to shunt the water from the line 20 and boiler 1 back into the supply tank 21 for recirculation to said boiler.

In the modified form of the invention shown in Figure 6, a tubular burner 51 is provided similar to burner 34 with the following exception. Midway of its ends, said burner 51 is provided with a depending nipple 52 into which the discharge end of the fuel supply tube 53, similar to tube 36, extends in the same manner. The nipple 52 has suitably secured therein in vertically spaced relation a series of foraminous plates 54 for breaking up the fuel. Opposite the nipple 52, and plates 54, said burner is provided in the top thereof with a depending wedge shaped spreader 55 for deflecting the fuel passing through said plates toward opposite ends of said burner. In this form of the invention, baffles 56, similar to baffles 49, are provided in the bottom of the burner but

inclining in opposite directions upon opposite sides of the spreader 55.

In Figures 8 and 9 the plant of my invention has been shown as adapted for domestic heating purposes. This adaptation of the invention is the same in all respects as the preferred embodiment already described with the following exception. The water storage tank 57, into the top of which water is admitted under pressure by way of line 58, is connected at its bottom to the inlet header 59 of the boiler 60 by a feed line 61 having a pump 62 interposed therein and a control valve 63 in said line between the pump and said header. The outlet header 64 has extended therefrom a discharge line 65 communicating with a pair of opposed radiating coils 66 each communicating, as by return branches 67, 68 with a return line 69 leading to the top of said tank 57. In this adaptation of the invention, the water is pumped from the tank 57 to the boiler 60 and into the line 65 and coils 66 to be returned to the tank 57 as will be clear. The coils 66 and 67 may be arranged at any remote location desired. A suitable float valve 70 in the tank 57 is provided for closing the end of the line 58 when said tank is approximately full and as shown in Figure 9.

The foregoing will, it is believed, suffice to impart a clear understanding of my invention without further explanation.

Manifestly, the invention as described, is sus-

ceptible of modification in other respects and as described without departing from the inventive concept and right is herein reserved to such other modifications as fall within the scope of the subjoined claim.

What I claim is:

In apparatus of the class described, a boiler comprising a pair of inlet and outlet end headers of tank-like form, a water inlet pipe line extending into the inlet header, a water discharge line extending from the outlet header, water circulating pipes extending between said headers, a combustion chamber in said boiler below said circulating pipes, a tubular air inlet manifold extending outwardly from one end of the boiler and opening into said chamber, a tank for a fluid fuel supply, a fuel supply line extending from said tank to said chamber through said manifold, a fuel pump in said fuel supply line, a tubular burner in said chamber attached to said line, an air compressor, a compressed air line extending from said compressor into said manifold parallel with said fuel line and having branches connected to the latter in said manifold, a plurality of flue pipes upstanding from the top of the boiler for the escape of the products of combustion therefrom, and a fuel heating line into which said flue pipes open and extending through the bottom of said tank.

ADAM B. CARLTON.