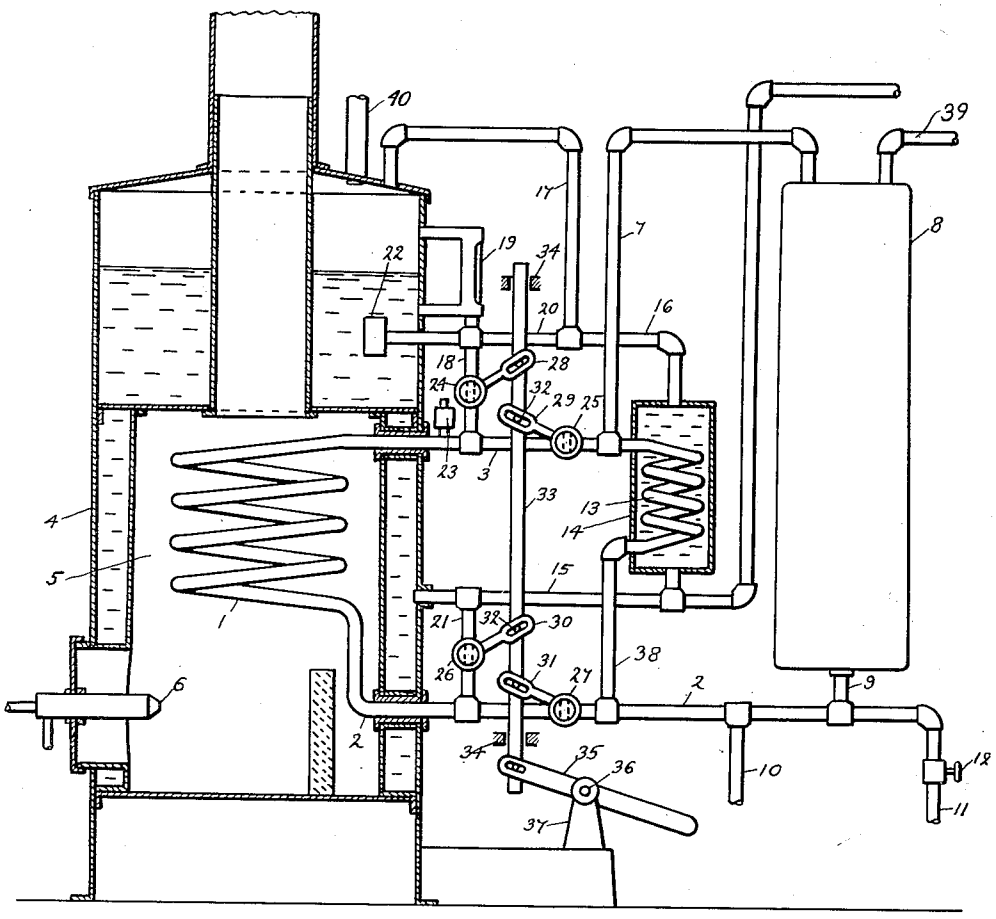
May 15, 1934. J. T. BARROW 1,958,736

HOT WATER SYSTEM

Filed April 1, 1933



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Patented May 15, 1934 1,958,736

UNITED STATES PATENT OFFICE

1,958,736

HOT WATER SYSTEM

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Application April 1, 1933, Serial No. 663,994

3 Claims. (Cl. 122—20)

My invention relates to water heating systems and has particular reference to systems employing heating coils used in conjunction with steam boilers and hot water tanks.

Hot water tanks for household purposes can be economically heated by special heat exchangers connected with heating steam boilers. In summer, however, when the heating boilers are not operated, it becomes necessary to provide special burners for the hot water tanks, these burners representing a rather expensive installation. In order to provide a simple, inexpensive and economical means for heating water in summer, I use a special heating coil placed in a furnace of a steam boiler above the burner and in the path of the hot products of combustion. This coil is connected with a hot water tank providing continuous circulation while the coil is being heated by the regular boiler burner, thereby furnishing hot water for household purposes. My arrangement is especially suitable for use with oil burners which can be regulated so as to furnish just enough heat for the coil without raising steam in the boiler. I also provide valve connections with the boiler so as to connect the coil with the boiler when desired and when the latter is being operated. In winter the coil can be connected with the boiler so as to form a part of it thereby increasing its heating surface and capacity, and improving the boiler efficiency by the better utilization of the exhaust gases. Water in the hot water tank can be then heated by the boiler water using an ordinary heat exchanger.

My invention is more fully explained in the accompanying specification and drawing in which the single figure represents a sectional elevation of a boiler with my heating system.

My heating system consists of a heating coil 1 with inlet and outlet pipes 2 and 3 respectively. The pipes extend through the walls of a steam boiler 4, the coil being supported on these pipes in a furnace 5 above an oil burner 6. The outlet pipe 3 is connected with a pipe 7 extending to the top of a hot water tank 8, and the inlet pipe 2 is connected with the bottom of the tank 8 through a pipe 9. A pipe 10 is connected with a source of fresh (cold) water (not shown), also with a drain pipe 11 having a valve 12. A heat exchanger coil 13 is connected at one end with the pipe 7 and at the other end with the pipe 2. This coil is placed in a heat exchanger 14 connected at the bottom with a hot water pipe 15, and at the top with the upper portion of the boiler through pipes 16 and 17. The pipe 3 is also connected with the boiler through a pipe 18 extending from the lower end of a water gage 19 and also connected with the pipe 17 through a pipe 20. The pipes 2 and 15 are connected by a pipe 21. The reference numeral 22 designates a thermostat which is used in a well known way to cause the oil burner 6 to operate when the water temperature is too low. A safety valve 23 is connected with the pipe 3. The pipe 18 has a valve 24, the pipe 3 has a valve 25, the pipe 21 has a valve 26, and the pipe 2 has a valve 27. These valves have handles 28, 29, 30 and 31 respectively with slots engaging pins 32 on a sliding rod 33 mounted in vertical bearings 34. One end of the rod 33 is connected with a lever 35 pivoted on a shaft 36 in a bracket 37. The free end of the lever is shaped as a handle.

The operation of my system is as follows.

During the winter, when the boiler 4 is being operated for heating the house by steam taken through the outlet pipe 40, the lever 35 must be turned as shown on the drawing, with the handle depressed, thereby raising the control rod 33. The valves 24 and 26 then are open and the valves 25 and 27 are closed. The coil 1 is then connected with the boiler and serves only for better utilization of the hot products of combustion in the furnace, increasing the boiler heating surface. Cold water from the feed pipe 10 passes into the lower end of the exchanger by the pipe 2 and 38. Heated water from the coil 1 enters the upper portion of the boiler through the pipes 3 and 18 and the lower pipe of the gauge 19. Hot water for household purposes is taken through the pipe 39 directly from the tank. The hot boiler water circulates through the heat exchanger 14 which is connected at the bottom with the pipe 15, and at the top with the pipes 3, 18, 20 and 16, and also with the steam pipe 17. The hot water in the heat exchanger heats the coil 13 which is connected with the top and bottom of the hot water tank 8 by the pipes 7 and 38 respectively. Under ordinary conditions of boiler operation there is enough heat imparted to the coil 13 to maintain circulation through this coil and through the tank thereby heating the water in tank. The automatic regulator 22 controls the temperature of water in the boiler at the top, being connected to the pipe 18. This regulator may be of any ordinary construction as used for this purpose in heating boiler installations.

During the warm weather when the boiler is not operated, the lever 35 is turned so as to lower the control rod 33 thereby closing the valves 24 and 26 and opening the valves 25 and 27. The coil 1 becomes then disconnected from

the boiler and directly connected with the tank 8 through the pipes 2 and 7. The burner 6 is controlled by the automatic heat regulator 22 to give just enough heat for heating the coil 1 without raising steam in the boiler the regulator having a manual adjustment for this purpose. The water heated in the coil circulates through the tank so that all water in the tank by proper setting of the heat regulator becomes heated. The heated boiler water also circulates through the heat exchanger as a heating adjunct to the coil 1 passing through the exchanger 14 thereby heating the water coil 13 which is connected to the tank by the pipe 7. The temperature of the water in the tank is controlled indirectly through the exchanger by the heat regulator which renders the temperature of the water in the tank and boiler the same. The supply of hot water cannot be diminished because the heat regulator operates on the boiler water which is secondary to temperature reduction.

My system can be also used with boilers for hot water heating, in which no steam is generated.

Important advantages of my system are that it simplifies the installation for summer and winter uses, as only one burner is required in either case, also that the burner is utilized more efficiently, the waste gases being used for heating water in the coil 1. This coil also adds to the effective boiler heating surface thereby increasing its output. A large storage of hot water is unnecessary with my system because of the fact that the heating is almost instantaneous. By using water from the tank and admitting the cold water to the boiler lowers the boiler temperature thereby operating the hydro-switch. The operation of my system is very simple, a single movement of the control handle being sufficient for changing the arrangement for winter or summer uses.

I claim as my invention:

1. In a water heating system, the combination with a water heating element supported in a boiler furnace, of pipes connecting the top and bottom of said element with the top and bottom of a hot water tank outside of said boiler, a heat exchanger outside of said boiler consisting of an inner and outer members, the top and bottom of said inner member being connected with the top and bottom of said tank, pipe connections between the ends of said heating element and said boiler, valves in said boiler pipe connections, valves in said tank pipe connections with said element outside of said boiler pipes, and pipe connections between said boiler and said outer heat exchange member, means for controlling said valves so that when said boiler valves are closed and said tank valves are open, and said heating element heats the water in said tank and in said heat exchanger thereby indirectly heating the water in said boiler, and when said boiler valves are open and said tank valves are closed, said heating element assists in heating the water in said boiler, and the water in said tank is heated through said heat exchanger from said boiler.

2. In a water heating system, the combination with a water heating element supported in a boiler furnace, of pipes connecting said element at the top and at the bottom with the top and bottom of a hot water tank outside of said boiler, a heat exchanger outside of said boiler consisting of an inner and outer members, the top and bottom of said inner member being connected with the top and bottom of said tank, pipe connections between the ends of said heating element and said boiler, valves in said boiler pipe connections with said element, valves in said tank pipe connections outside of said boiler pipe connections, pipe connections between said boiler and said outer heat exchange member, and a member connecting all four of said valves, said member being adapted to be moved manually between two limiting positions, in one position said boiler valves being open and said tank valves being closed, and in another position said boiler valves being closed and said tank valves being open.

3. In a water heating system, the combination with a water heating element supported in a boiler furnace, of pipes connecting said element at the top and at the bottom with the top and bottom of a hot water tank in circuit outside of said boiler, pipes connecting said element with said boiler in circuit, a heat exchanger outside of said boiler comprising inside and outside members, one of said members being connected with said element in circuit and the other member being connected with said tank in circuit, and means to manually open the connections between said element and said boiler while closing the connections between said element and said tank, said means being also adapted to manually close the connections between said element and said boiler while opening the connections between said element and said tank.

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