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HEATING SYSTEM

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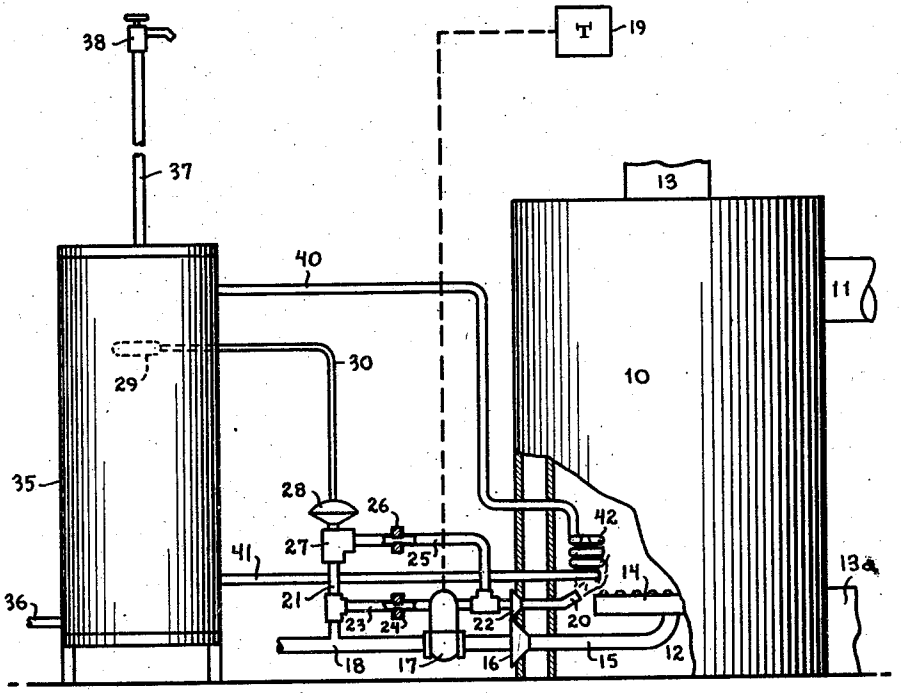

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HEATING SYSTEM

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The present invention relates to a heating system, and more particularly to a method and system for heating a supply of domestic hot water from a pilot burner which also functions as an ignition means for a main burner in a heating device.

Many present domestic heating plants have a plurality of heaters for heating a space conditioning medium and a supply of domestic hot water. Still other systems utilize the heat of the space heating main burner during the winter but not during the summer. These latter systems usually require a manual changeover involving shutting off of the main burner and turning on of an auxiliary burner during the summer. Still other systems use a heater which selectively or simultaneously heats both a heating medium and a supply of hot water. Such systems require rather complicated parts and are therefore both expensive to install as well as more likely to fail or give trouble after a period of use.

Another problem which has long been present in gas burners, oil burners, stokers, and the like, is the provision of a positively operating pilot burner. In the past, pilot burners have been kept small to minimize the consumption of fuel thereby. Although it is well known that a larger pilot burner would eliminate many of the difficulties experienced with the smaller burners, the larger burners have not met with favorable reception because of the obvious increased expense of operating the same. With a heating plant having several hundred feet of radiating area this is quite true, because even a pilot burner which utilizes two to three thousand B.t.u.'s an hour will have very little, if any, appreciable effect upon the temperature of the space being conditioned. Therefore, to meet the householders, demands for an economical system, the manufacturers have complied by offering a very small pilot burner. In many instances this economy has proven fallacious as a result of failure of the pilot to function properly and thus cause serious property damage from fire or asphyxiation from unignited gas.

The instant invention obviates the above recited difficulties for both the hot water heating system and the positive operating pilot. The present system provides an oversize pilot which can burn a sufficient amount of fuel to produce a big flame. The heat of this flame may be made use of to heat a supply of hot water, or some other heat using device, and the flame itself may positively ignite a fuel burner which may be of the gas burner type, an oil burner, a solid fuel stoker, or a powdered fuel burner.

The preferred type of heating system to be described is a hot air furnace provided with a gas burner and a large water heater pilot. Inasmuch as a large proportion of the heating plants installed in dwellings are of the hot air type, such a system is desirable. Hence the present invention is preferably suited to such an application, but it is to be clearly understood that the invention is not to be limited only to this use. For example, the invention could well be utilized in a steam or hot water system, or with some other heat using device.

An object of the present invention is to provide a system, which makes use of the heat of a pilot burner for accomplishing a function other than igniting the main burner.

Another object is to provide a novel control arrangement for the system set forth in the preceding object.

A further object is to provide a heat exchanger which utilizes the heat of a pilot burner at all times and any desired portion of the heat of the main burner when it is in operation to heat a supply of domestic hot water.

The above and other objects will be in part obvious and in part pointed out in the accompanying specification and claims, taken in conjunction with the accompanying drawing, the single figure of which diagrammatically illustrates my invention in combination with a hot air heating device.

The furnace 10 has a flue 11 and a combustion chamber 12. A hot air delivery duct 13 transfers heated air from the furnace 10 to a space to be conditioned, not shown. Cooled air is returned from the space to the furnace 10 by a duct 13a. A burner 14 is located within the combustion chamber 12 and is supplied with a suitable fuel, for example, gas, through a conduit 15. A mixing means 16 is provided in the conduit 15 to mix the gas with air to provide a mixture having suitable combustion characteristics. A valve 17 is positioned in a fuel supply pipe 18 which supplies the conduit 15 and is controlled by a thermostat 19 to intermittently supply the burner 14 with gas in accordance with variations in temperature to which the thermostat 19 is subjected. It is to be understood that other suitable controllers might be used to control the valve 17.

A pilot burner 20 is located within the com-

bustion chamber 12 adjacent to the main burner 14. The pilot burner 20 is supplied with gas from a header 21 which is connected to the gas supply pipe 18. A mixing means 22 is associated with the pilot burner 20 so that a mixture of gas and air having proper combustion characteristics will be delivered to the pilot burner 20. A supply conduit 23 having a restriction 24 therein of a predetermined capacity supplies gas to the pilot burner 20 at all times. The orifice in the restriction 24 is so selected that the pilot burner 20 will be supplied with a minimum amount of gas for performing the combined function of ignited gas issuing from the main burner 14 as well as heating a supply of domestic hot water in a manner to be hereinafter more particularly described. A second conduit 25 having a second restriction 26 therein and a valve 27 also supplies gas to the pilot burner 20. The valve 27 may take the form of a conventional direct acting pressure actuated valve. The valve 27 has a conventional pressure motor 28 which is connected to a thermostatic bulb 29 through a tube 30 in a manner so that the pressure changes caused by a difference in temperature to which the bulb 29 is subjected will create a pressure within the motor 28 to thereby position the valve 27.

As an example of one obvious use for the heat of the pilot flame, a domestic hot water system is shown. A hot water supply tank 35 is provided with a supply pipe 36 leading to a suitable water supply such as the city water system or other system and a suitable hot water standpipe 37 supplied with a manual valve 38. The valve 38 is of any conventional type such as placed in a kitchen, bathroom or other place in a dwelling. Pipes 40 and 41 connect the hot water tank to a heater 42 of any suitable kind and shown as a coil located within the combustion chamber 12 of the furnace 10. The coil 42 is arranged with relationship to the pilot burner 20 so that substantially all of the usable heat from the flame produced by the pilot burner will be transferred to the coil 42. The coil 42 may be disposed in a manner so as to receive some heat from the flame produced by the main burner 14 when it is operating. By so locating the burner the water receives additional heat supplied by the main burner during the cold weather so that the normal seasonal temperature depression of water supply from the source of city water, for example, may be compensated for as well as the additional use of hot water during winter months.

Operation

During the summer months it may be found desirable to heat approximately twenty five pounds of water per hour to 200° F. for normal demands of the householders. In the summer the temperature of the city supply of water might be approximately 70° F. Therefore to heat the water from 70° F. to the desired 200° F. there would be a difference of 130°. If the tank 35 were insulated perfectly, there would be a requirement of 3250 B. t. u.'s an hour to so heat the water. For storage tanks that are poorly insulated or uninsulated the B. t. u. requirement would necessarily be higher. Therefore it is seen that in order to heat the supply of domestic hot water to the desired temperature it will be necessary to supply 3250 or more B. t. u.'s to the heating coil 42 which is located in the flame produced by the pilot burner 20. Inasmuch as the normal B. t. u. content of the supplies of illuminating gas to the household may vary between 550 up to 880 or more B. t. u.'s per cubic foot, the pilot burner 20 would burn from four to six and a half, or possibly more, cubic feet of gas per hour. By burning this amount of gas a relatively large pilot burner is provided and therefore the difficulties heretofore experienced with small pilot burners, which may become wholly or partially plugged due to the deposits of impurities present in most gas, will be obviated.

If an amount of hot water greater than the amount above described is desired the valve 27 will be actuated by the thermostat 29 which will detect the lowering of temperature within the storage tank 35. As the valve 27 is opened a greater supply of gas will be delivered to the pilot burner 20 because the orifice 26 will also permit flow of a predetermined amount of gas thereto. It will be seen therefore that the valve 27 in its wide open position will permit the maximum of gas to pass the orifice 26 which will add to the amount passing the orifice 24 to give a maximum amount of heat to the heating coil 42. The amount of gas which may be delivered thereto is only limited by the structure selected as well as the requirements of different householders for different amounts of hot water.

In the winter time, in many instances, more hot water is used by a householder. Also in the winter time the supply of water from the city supply is usually cooler than in summer. By properly locating the heating coil 42 adjacent the pilot burner 20 and the main burner 14 these differences in demands may be compensated for because the main burner 14 will be intermittently operated in response to temperature variations to which the thermostat 19 is subjected. However if the demands are even greater the valve 27 will function in the manner recited above in response to temperature changes at the thermostatic bulb 29 to cause the pilot burner to deliver more heat to the heating coil 42.

While I have shown and described my system with an automatic valve for controlling the amount of fuel delivered to the pilot burner it will be clearly understood from the above description that the valve mechanism 27 and the corresponding control are merely to give extremely accurate temperature control to supply an adequate amount of hot water at all times. There will be many installations wherein such accurate control is not needed nor particularly desired. In such installations a manual valve may be substituted for the valve 27 and the householder may adjust this valve to obtain the amount of hot water which he desires. Also many installations may not need any adjustment whatever in which case the by-pass conduit 25 may be eliminated entirely. Obviously in view of the disclosure above, many other uses for the heat of the pilot burner will occur to those skilled in the art. For example, this heat could readily be utilized to operate a generator for an absorption type of refrigerator, or some other known user of heat. It is seen therefore that my invention may take many forms and it is my desire not to be limited to that form shown and described but by the scope of the appended claims.

I claim as my invention:

1. A heating system comprising, in combination a heater for a space, an intermittently operable main burner therein, fuel delivery control means for controlling the operation of said burner, a pilot burner within said heater arranged so that a flame issuing therefrom will ignite fuel

issuing from said main burner to cause operation thereof, a domestic hot water storage tank, a heating coil connected to said tank located so as to be heated by said pilot burner at all times and by said main burner when it is operating, a first conduit including a minimum capacity restriction for supplying a predetermined amount of fuel to said pilot burner at all times, a second conduit including a maximum capacity restriction for also supplying fuel to said pilot burner, and means responsive to the temperature of the water within said storage tank for controlling the amount of fuel delivered to said pilot burner graduatingly between said minimum and maximum capacities.

2. In a heating system comprising, a hot air furnace, an intermittently operable main gas burner within said furnace, a gas conduit leading thereto, a control valve in said conduit, and control means including a space thermostat for controlling said valve, in combination, a pilot burner within said furnace arranged so that a flame issuing therefrom will ignite the gas issuing from said main burner, a hot water storage tank, a heating coil connected to said tank located so as to be heated by said pilot burner and by said main burner when it is operating, a first conduit including a first minimum capacity restriction for supplying a predetermined amount of gas to said pilot burner at all times, a second conduit including a second restriction to provide in conjunction with said first restriction a predetermined maximum amount of gas to said pilot burner, a valve in said second conduit operable graduatingly between closed position and fully open position, and a thermostat responsive to the temperature of the water in said storage tank for positioning said valve.

3. In combination with a domestic heating system, an intermittently operable main burner for heating a space, a pilot burner for igniting said main burner, thermostatically actuated means for controlling a supply of fuel to said main burner, a plurality of supply means for supplying fuel to said pilot burner, a hot water system, thermostatically actuated means associated with said hot water system and said supply means for controlling the amount of fuel delivered to said pilot burner, and a hot water heating means arranged so as to be continuously heated by said pilot burner and intermittently heated by said main burner.

4. In combination with a heating system, an intermittently operable main burner, a continuously operating pilot burner for igniting said main burner, control means for intermittently supplying fuel to said main burner, adjustable means for continuously supplying fuel to said pilot burner, a hot water system, and heat utilizing means in said system arranged so as to be continuously heated by said pilot burner and intermittently heated by said main burner.

5. A heating system comprising, in combination, an intermittently operable main heater for heating a space to be conditioned, a main burner therein, a constantly operating variable capacity auxiliary burned adjacent said main burner for igniting fuel issuing therefrom, an auxiliary heater within said main heater, said auxiliary heater being adjacent said auxiliary burner to receive heat therefrom at all times and from said main burner when it is operating, and temperature responsive means for varying the capacity of said auxiliary burner in response to temperature variations of a medium heated by said auxiliary heater.

6. A domestic heating and hot water system comprising means for circulating a fluid heating medium in heat exchange relationship with a space, an intermittently operable main burner for heating said fluid heating medium, means for supplying fuel to said main burner, means in heat exchange relationship with said main burner for transmitting heat for domestic hot water, means for supplying fuel to a pilot burner, and a pilot burner disposed in igniting relationship with said main burner and for heating said means for transmitting heat for domestic hot water.

7. A domestic heating and hot water system, comprising a furnace, first means in said furnace for transmitting heat to a fluid heating medium for heating a space, an intermittently operable main burner in the combustion chamber of said furnace for heating said first means, fuel supply means for said main burner, second means in the combustion chamber of said furnace for transmitting heat for domestic hot water, means for supplying fuel to a pilot burner, and a pilot burner disposed in igniting relationship with said main burner and for heating said second means.

8. A domestic heating and hot water system, comprising a furnace, first means in said furnace for transmitting heat to a fluid heating medium for heating a space, an intermittently operable main burner in the combustion chamber of said furnace for heating said first means, fuel supply means for said main burner, second means in the combustion chamber of said furnace for transmitting heat for domestic hot water, means for supplying fuel to a pilot burner, and an oversize pilot burner for producing an oversize pilot flame in igniting relationship with said main burner and for heating said second means.

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