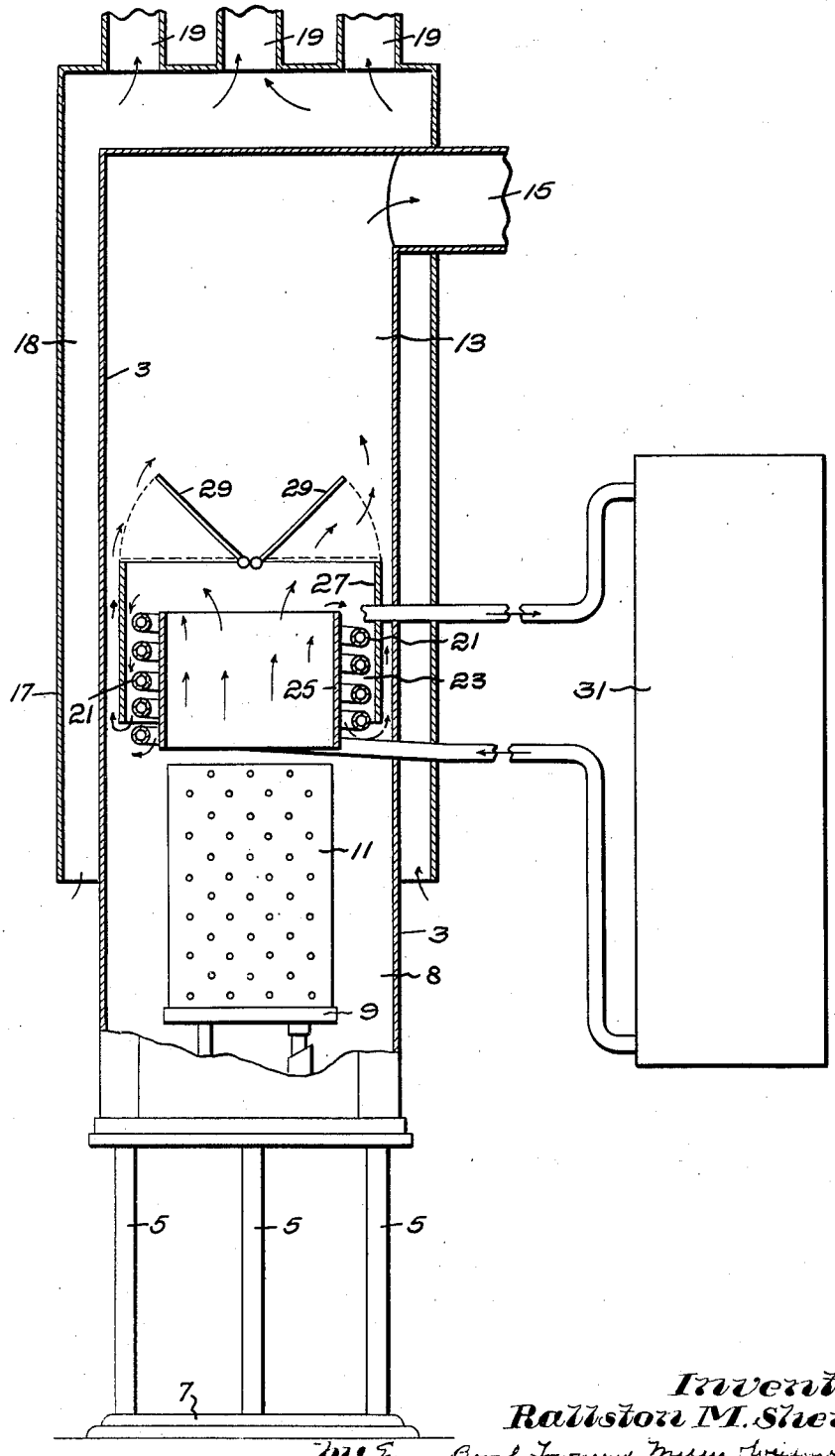
Sept. 1, 1942. R. M. SHERMAN 2,294,579

HEATING DEVICE

Filed Nov. 13, 1939.



Inventor:
Ralston M. Sherman,
by Emery Booth Townsend Miller & Strickler
Attys.

Patented Sept. 1, 1942

2,294,579

UNITED STATES PATENT OFFICE

2,294,579

HEATING DEVICE

Ralston M. Sherman, Glastonbury, Conn.

Application November 13, 1939, Serial No. 303,931

3 Claims. (Cl. 126—101)

This invention relates to house heating devices which are utilized at the same time for heating the water required for domestic or other purposes through the inclusion in the heater of heat transfer elements, such as water coils or pipes. The term "house heating devices" is intended to include such devices as are employed for the heating of the air in rooms, living apartments and other like spaces by a circulation thereto from the burner of hot air, water or steam.

While the invention is not limited thereto, it has particular application to heaters equipped with vaporizing types of oil or other liquid fuel burners, that is to say, those in which the liquid oil is converted into vapor by contact with parts of the burner which become highly heated from combustion of fuel, the vapor being then commingled with air and burned. Such burners, the use of which is common in the case of small houses or apartments where the space to be heated is not excessive, involve the generation of products of combustion of high temperature and are operated intermittently from time to time as is demanded by the requirements of heat in the room or rooms to be heated. Such requirements call for prolonged and frequent operation during the colder periods of the year, but infrequent or no operation during other periods. On the other hand, the requirements for hot water supply undergo no such wide variations. If the pipes, coils or other heat transfer elements used for the heating of the domestic hot water supply are subject to the same heating effects from the products of combustion at all times of the year, the heat required for house heating during the winter season is in excess of requirements for water heating and the heat applied to heating the water during the summer season is superfluous and wasteful for house heating and undesirable in its heating effect on the air of the living spaces.

This presents a problem, particularly in the case of vaporizing types of liquid fuel burners, where natural draft is often relied on to conduct the products of combustion upward from the combustion chamber of the heater to and through the flues so that the general path of the gases is in an upward direction.

One object of the present invention is to so dispose the heat transfer element used for heating the water that the products of combustion for the burner may act on such elements with varying degrees of effectiveness, dependent on the heat requirements in the living apartments which are serviced by the burner.

In the specific embodiment of the invention shown for illustrative purposes, this is accomplished by placing the heat transfer elements in a space from which the products of combustion may be diverted in greater or less measure during the colder periods of the year, but to which they may be directed during the warmer periods, the heating effect of such products of combustion on the heat applied to the living apartments being at the same time materially lessened.

The invention will be best understood by reference to the following description, taken in connection with the accompanying drawing showing one illustrative embodiment thereof.

In the drawing there is illustrated one form of a hot-air, house-heating, oil burning device equipped with a hot water heater for supplying water for domestic uses.

Referring to the specific embodiment of the invention shown in the drawing, there is illustrated a hot air heater comprising an upright stack or burner casing consisting of a cylindrical shell 3 supported by pedestals 5 on the base 7. The lower part of the casing forms a drum-like air chamber 8 surrounding a vaporizing type of oil burner which is mounted in the chamber. This burner may be of any suitable type, as, for example, a combustion tube "pot" burner or a wall flame rotary burner, but herein there is indicated a combustion tube burner of the so-called wick type. This consists of the burner base 9 to which oil is supplied through any suitable oil feed pipe (not shown), the base being surmounted by one or more perforated open-top cylindrical shells or combustion tubes, the outer one of which is indicated at 11, and within which shell or shells is contained the combustion chamber. Air, admitted to the space within the casing 3 surrounding the combustion tube, is supplied to the combustion chamber, in whole or in part, through the perforations in the shell 11. The liquid oil is vaporized by its contact with the heated base and other parts of the burner and the vapor commingles with the air supplied to the combustion chamber. Combustion being initiated within the shell, the commingled air and oil in a state of substantially complete combustion emerge from the open top of the shell and the products of combustion pass up into a heating chamber 13 provided by the upper part of the burner casing, escaping through the flue 15.

The burner casing 3, for its entire length above the burner, is surrounded by an outer casing 17 spaced from the burner casing and forming an intermediate air chamber 18. Through the open bottom of the chamber 18 air is freely admitted

and is heated by its contact with the walls of the heating chamber. The hot air is delivered through one or more hot air conduits 19 opening from the top of the casing 17 and leading to the apartment or apartments to be heated. The air chamber 18 in association with the walls of the casing 3 constitute house heat transfer means for heating the air of the room or rooms serviced by the burner. In this case such house heat transfer means acts directly on the air supplied to the room or rooms but means may be employed acting indirectly thereon, as through the use of hot water or steam coils subject to the heat of the burner.

The burner may be provided, if desired, with usual thermostatically controlled automatic starting and stopping devices responsive to the heating requirements in the heated apartments, but, as such automatic controlling devices are well known, no attempt has been made to illustrate them in the drawing.

For the domestic hot water supply, auxiliary heat transfer devices subject to the heating effect of the burner are provided in the form of spirally arranged water coils 21. These are herein positioned above the burner, between the latter and the heating chamber, but are disposed in an annular space or water heating chamber 23 normally out of the direct path of the products of combustion. This disposition is effected by supporting within the casing 3 the cylindrical shell 25, the shell being so related to the combustion chamber of the burner, and herein by presenting its open bottom directly above the open top of the burner, that the highly heated products of combustion normally pass directly into the shell 25 and thence therethrough and upward into the heating chamber 13. A second outer shell 27 is provided, surrounding and spaced from the heating coils, and spaced from the first shell and also from the walls of the casing 3. This provides an annular water heating space or chamber 23 open at the top and at the bottom, within which the coils are positioned one above another. Provision is made for the diversion of products of combustion when desired into the top of the water heating chamber, herein by extending the outer shell 27 for a substantial distance above the top of the inner shell.

In the normal or winter operation of the burner, the products of combustion pass directly from the top of the outer shell 27 into the heating chamber 13, but are preferably deflected against the side walls of the heating chamber to intensify the heating effect imparted thereto by means of the hinged baffle plates or dampers 29 mounted on the top of the outer shell 27.

Hot water may be supplied for domestic use from the coils 21 through any desired distributing apparatus or system but herein they are shown as connected to a usual hot water storage tank 31, the colder water passing from the bottom of the tank to the lowermost coil and the heated or hotter water passing from the uppermost coil to the upper part of the tank. The usual automatic devices (not shown) may be employed for starting the burner in response to temperature requirements in the storage tank.

Under the usual or cold weather operation of the burner, where the latter is being operated for frequent and prolonged periods, the products of combustion pass directly upward from the open top of the combustion tube into the bottom of the shell 25, through the latter and out through the open top of the shell 27 into the heating chamber, whence they are deflected outwardly against the walls of the casing 3.

Under such conditions of cold weather operation, the coils 21 are heated from such of the heated gases as arise from the space surrounding the burner as well as from the heat of radiation and conduction. The heat then transferred to the water coils, while a relatively small part of the total heat generated by the burner, is adequate to meet all hot water requirements during cold weather operation of the burner.

In warm weather, where there is little or no need for operating the burner for room heating purposes, the hinged baffles or dampers 29 are turned down by externally operated handles to close or partially close the top of the outer shell 27, so that products of combustion no longer pass directly into the heating chamber 13 but are deflected downwardly into direct contact with the coils, passing down through the annular water heating space 23, through the bottom thereof, and thence outwardly and upwardly between the walls of the outer shell 27 and those of the casing 3. In this path the hot gases contact first with the upper coils through which the hot water is being delivered to the storage tank, and last in contact with the coils through which the colder water is coming from the tank. This provides for the most effective transfer of heat from the products of combustion to the coils, so that the temperature of the products of combustion passing into the heating chamber and into contact with the walls of the casing 3 is reduced to a minimum.

The disposition of the water heating coils in conjunction with the dampers thus provides means not only for varying the heating effect of the burner on the heating coils, but for increasing such heating effect while at the same time decreasing the heating effect on the house heat transfer means.

While for purposes of illustration one specific example of the invention has been shown and described, it will be understood that extensive variations in the form and construction and relative arrangement of its parts may be made, all without departing from the spirit of the invention.

I claim:

1. In a house heating device, an oil burner of the vaporizing type having an open top perforated combustion tube, a burner casing enclosing said burner and providing an air chamber surrounding said tube and a heating chamber above the burner, a casing surrounding and spaced from the heating chamber, presenting an intermediate air chamber and constituting, with the walls of said heating chamber, house heat-transfer means for heating the air of a room, a cylindrical shell within the burner casing of a diameter not substantially less than that of the combustion tube, said shell having its lower open end immediately above the open top of the combustion tube and providing a direct passage for the products of combustion from the burner, a second cylindrical shell surrounding but spaced from the first shell and spaced also from the surrounding walls of the casing, providing an annular space between the two shells and providing also a second annular space between the second shell and the walls of the burner casing, said second shell having its open upper end above the top of the first shell; a series of auxiliary heating coils for heating water

for domestic use arranged spirally between the two shells and subject to the heating effect of the burner but normally out of the direct path of the products of combustion from the burner, a water storage tank having connection from its lower part to the lowermost coil and from its upper part to the uppermost coil of the series, and damper means for the open top of the second shell to provide for direct travel of the products of combustion from said shell into the heating chamber or to cause the same to travel downwardly through the annular space in direct contact with the series of auxiliary heating coils, and thence upwardly into the heating chamber through the second annular space.

2. In a house heating device, an oil burner having an open top combustion tube, a casing housing said burner and providing a chamber above it, air heating means associated with said chamber, a flue within said casing above and adjacent the burner for conducting products of combustion from said burner to said chamber, which flue is so disposed with relation to the casing walls as to provide a space between it and said walls, means within said space subject to the heating effect of the burner for heating water for domestic use, and damper controlled means selectively operative to cause products of combustion discharged from said flue to pass directly into said chamber or into the latter by way of said space.

3. In a house heating device, an oil burner having an open top combustion tube, a casing housing said burner and providing a chamber above it, air heating means associated with said chamber, a sleeve in said casing above and adjacent the burner in spaced relation to the casing walls for conducting products of combustion from said tube to said chamber, an outer sleeve surrounding the first mentioned sleeve in spaced relation thereto and the casing walls, auxiliary heat transfer means subject to the heating effect of the burner for heating water for domestic use, which auxiliary means is positioned in the space between said sleeves, and damper means associated with said outer sleeve for selectively causing the products of combustion from the burner to pass directly from the first mentioned sleeve into said chamber or into the latter by way of the space between the sleeves and the space between the outer sleeve and the casing walls.

RALLSTON M. SHERMAN.