Feb. 22, 1927. 1,618,565

W. D. BELL

OIL BURNER

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Fig. 3.

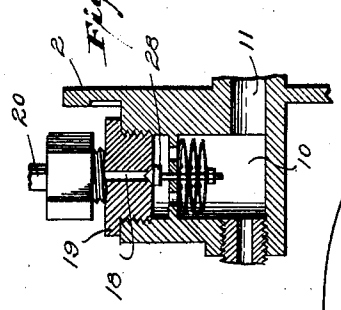


Fig. 1.

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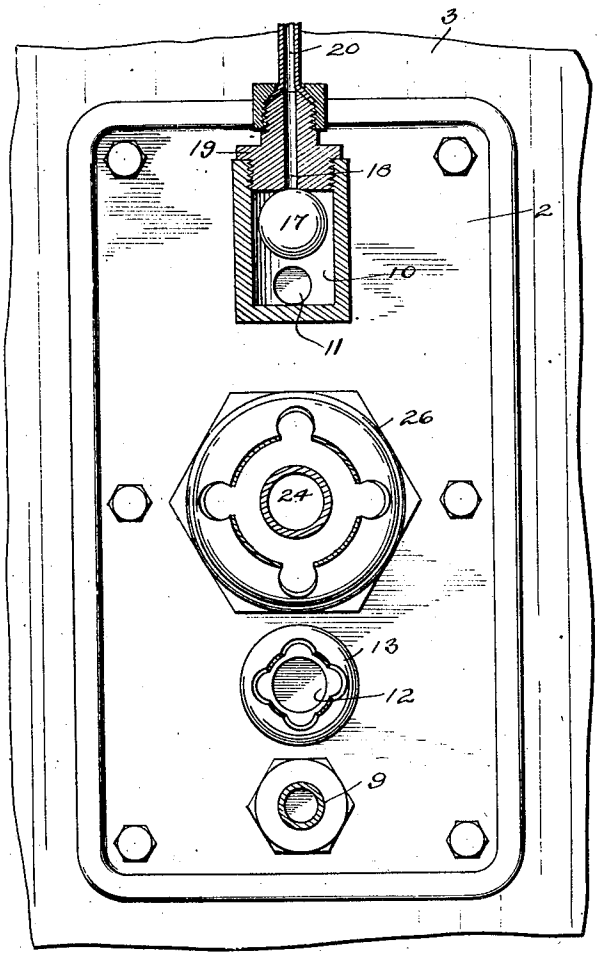
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Filed Jan. 15, 1925 2 Sheets-Sheet 2

Fig. 2.



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Patented Feb. 22, 1927. 1,618,565

UNITED STATES PATENT OFFICE.

WILLIAM D. BELL, OF COLUMBUS, OHIO.

OIL BURNER.

Application filed January 15, 1925. Serial No. 2,668.

This invention relates to improvements in oil or vapor burners and has specific application to an improved and simplified automatic vapor burner embodying features of construction which adapt the same particularly to the house heating plants, the vapor burner being in the form of a unit which may be readily inserted in an ordinary coal or gas burning furnace so that oil may be used as the principal source of fuel rather than gas or coal.

Another object of the invention resides in the provision of a simplified oil or vapor burner so arranged that the oil burner does not become operative until steam has been generated in the unit, there being a steam generated coil provided which is initially heated by a gas burner, the arrangement being such that by the provision of an automatic control valve, responsive to steam conditions in the coil, the operation of the oil burner will be automatically regulated. By this arrangement steam flow to the atomizing nozzle of the oil burner is automatically permitted when sufficient steam has been generated and closes when for any reason the steam supply falls, a vapor burner for house heating plants being thereby provided which is both safe and economical to operate.

Further objects of my invention will appear in the enclosed specification and drawings, and in said drawings:

Figure 1 is a vertical sectional view taken through the oil or vapor burner unit comprising the present invention,.

Figure 2 is a vertical sectional view taken on the line 2—2 of Figure 1, and

Figure 3 is a detail view of a slightly modified form of control valve used in the burner.

Referring more particularly to the details of the invention the numeral 1 designates my improved oil or vapor burner unit in its entirety. In the present adaptation of the invention the unit is constructed specifically for installation in furnaces of the type commonly used in the heating of dwellings or residences, but it is obvious that by mere change in proportion the unit may be employed in any capacity wherein an oil burner is desired.

As a convenient way of mounting the unit, there is provided a front plate 2, which is adapted to be secured in any suitable manner to the front wall 3 on any standard form of furnace in such manner that the plate 2 will be located over one of the door openings 4 of the furnace. The plate 2 in this instance is provided upon its rear surface with tubular threaded extensions 5 to which are secured by means of threaded binding devices 6, the upper and lower ends of a steam generating coil 7. In this instance the coil is of substantially U form and is preferably formed from copper tubing. It will be understood, however, that while but one coil has been shown in the accompanying drawings, it is within the scope or range of the invention to employ as many coils as practice may find necessary. In this instance the open ends of the coil 7 are spread so as to seat upon the frusto-conical faces 8 of the extensions 5 and by co-acting with similarly formed faces provided upon the binding devices 6, the coil is securely retained in connection with the plate 2 and a fluid tight connection established therewith. By reason of its position the coil 7 will extend into the fire box of the furnace when in a customary position of operation.

The lower of the extensions 5 communicates with a water supply pipe 9, which preferably leads to a municipal water main, so that water under pressure will be permitted to pass through the coil 7, entering a chamber 10, formed in the upper part of the plate 2 and in communication with the upper leg of the coil 7 by means of a passage 11. Also carried by the plate 2 is a tubular gas burner 12, which extends into the furnace and is disposed within the confines of the coil 7. The outer end of the burner 12 carries the usual mixing shell 13, into which projects one end of a gas pipe 14, leading from a source of gas supply 15. In the initial operation of the unit the burner 12 is supplied with a maximum volume of gas so that peak combustion will take place permitting of the rapid heating particularly of the water in the upper part of the coil 7, which quickly generates steam in the chamber 10, as well as the upper leg of the coil.

In communication with the chamber 10 is a thermostatic valve 16 which includes a stem, as shown in Figure 1, for opening and closing the end of the pipe 15 in response to temperature variations and, by means of which the flow of gas to the burner 12 is regulated automatically, by this means provision is made to reduce the burner 12 to

its normal function as a pilot after the initial generation of steam in the coil of the unit. Also mounted within the chamber 10, in this instance, is a float valve 17. When water is contained within the chamber 10, the float valve arises to assume the position disclosed in full lines in Figure 1, thereby closing a restricted port 18 provided in a removable cap 19 formed in connection with the chamber 10. When occupying its elevated position, water or steam flow through the port 18 is prevented.

Secured to the cap 19 and in communication with the port 18, is one end of a relatively short tube section 20, which has its opposite or lower end arranged to communicate with an aspirator or atomizing nozzle 21. This nozzle comprises the usual steam port 22, an oil or fuel port 23, which ports terminate in a common conically enlarged outlet or atomizing chamber 24, the ports 22 and 23 being controlled by a manually adjustable needle valve 25. Moreover, surrounding the chamber 24 is an air supply and mixing shell 26, by means of which additional oxygen is supplied to the vaporized fuel products issuing from the chamber 24 so as to provide a resultant highly combustible mixture.

In operation, water under normal city pressure is permitted to flow through the coil or coils 7, so as to fill the chamber 10, and close the port 18 by means of the float valve 17. The thermostatic valve 16 is then contracted to permit of maximum gas flow to the burner 12, which when ignited quickly produces steam in the coil 7 and the chamber 10. When steam is present in the chamber 10, the pressure is such as to drive the water back into the source of water supply, allowing the steam to accumulate in the chamber 10. However, because of its spherical form and the absence of water, the float in the chamber 10 drops to assume the dotted line position as shown in Figure 1, thereby opening communication between the source of steam supply and the atomizing nozzle 21. Upon the presence of steam in the chamber 10, the thermostatic valve 16 then operates to close or arrest the quantity of gas flowing to the burner 12, which then reduces the flame at the burner 12 to that of a pilot flame only, however, this reduction is gradually accomplished by the automatic nature of the valve 16. It will be apparent that when the needle valve 25 is open, steam will rush into the atomizing nozzle and will issue from the nozzle by way of the chamber 24, during its passage over the angularly directed outlet 27 of the oil port 23 a suction or aspirating effect will be produced combining the oil with the steam, and later on with the air from the shell 26 to produce a highly combustible mixture, the portions of this mixture may of course be regulated by the provision of the valve 25. The mixture when issuing under pressure and in volatile form from the chamber 24, comes into contact with the flame of the burner 12, thereby producing combustion of the combined oil and steam vapors within the furnace so that the walls of the latter may gain a temperature necessary for the purposes for which the latter unit has been designed.

From the foregoing description taken in connection with the accompanying drawings it will be seen that the present invention provides a simple, practical and economical vapor burning unit which may be usefully employed at relatively low costs for the convenient and automatic heating of houses or homes or may be put to any other use to which an oil burner of this type may be placed. The operation of the burner is essentially automatic since after the initial lighting of the pilot burner 12 no attention need be given the unit except the occasional replenishing of the oil or fuel supply. Moreover, by the provision of the float valve 17 in the event that steam pressure fails for any reason in the unit, steam flow into the atomizer 21 will be arrested automatically and oil flow thereby arrested. It is of course within the range of the invention to provide a different type of automatic valve than the form of valve 17 shown in Figure 1. For example, as set forth in Figure 3 the thermostatic valve 28 may be employed in lieu of the float 17 and equivalent results obtained.

What is claimed is:

1. A burner unit of the character set forth embodying a base plate arranged to be fitted over an opening in the wall of a furnace, a U-shaped steam generating coil carried by said plate and projecting rearwardly therefrom into said furnace, said coil being disposed in a substantially vertical plane, connections carried by said plate and in communication with the lower leg of said coil for admitting water into the latter, a steam dome formed with said plate and in communication with the upper leg of said coil, a fuel mixer carried by said plate and situated between the upper and lower portions of said coil, a steam passage between said dome and said mixer, a valve automatically operable upon the presence of water in said dome to close said passage, a gas burner carried by said plate, and a valve responsive to the temperature in said dome to regulate gas flow to said burner.

2. In an oil burning mechanism of the character set forth, a base plate, an atomizing burner carried by said plate and extending longitudinally thereof into a furnace opening, a steam generating U-shaped coil carried by said plate and disposed to occupy a substantially vertical plane with

the legs thereof disposed on opposite sides of said burner and with the intermediate portion of said coil lined in the path of flame propagation from said burner, connections between the lower leg of said coil and a source of water supply, a steam chamber provided in connection with said base plate and in communication with the upper leg of said coil, a conduit leading from said chamber to said burner, valve means in said chamber and operative automatically to close said conduit upon the presence of water in said chamber, a pilot burner arranged adjacent to said coil, a source of fuel supply leading to said pilot burner, and an automatically operated valve means in said source of fuel supply and responsive to temperatures within said chamber to regulate the quantity of fuel delivered to said burner.

In testimony whereof I affix my signature.

WILLIAM D. BELL.