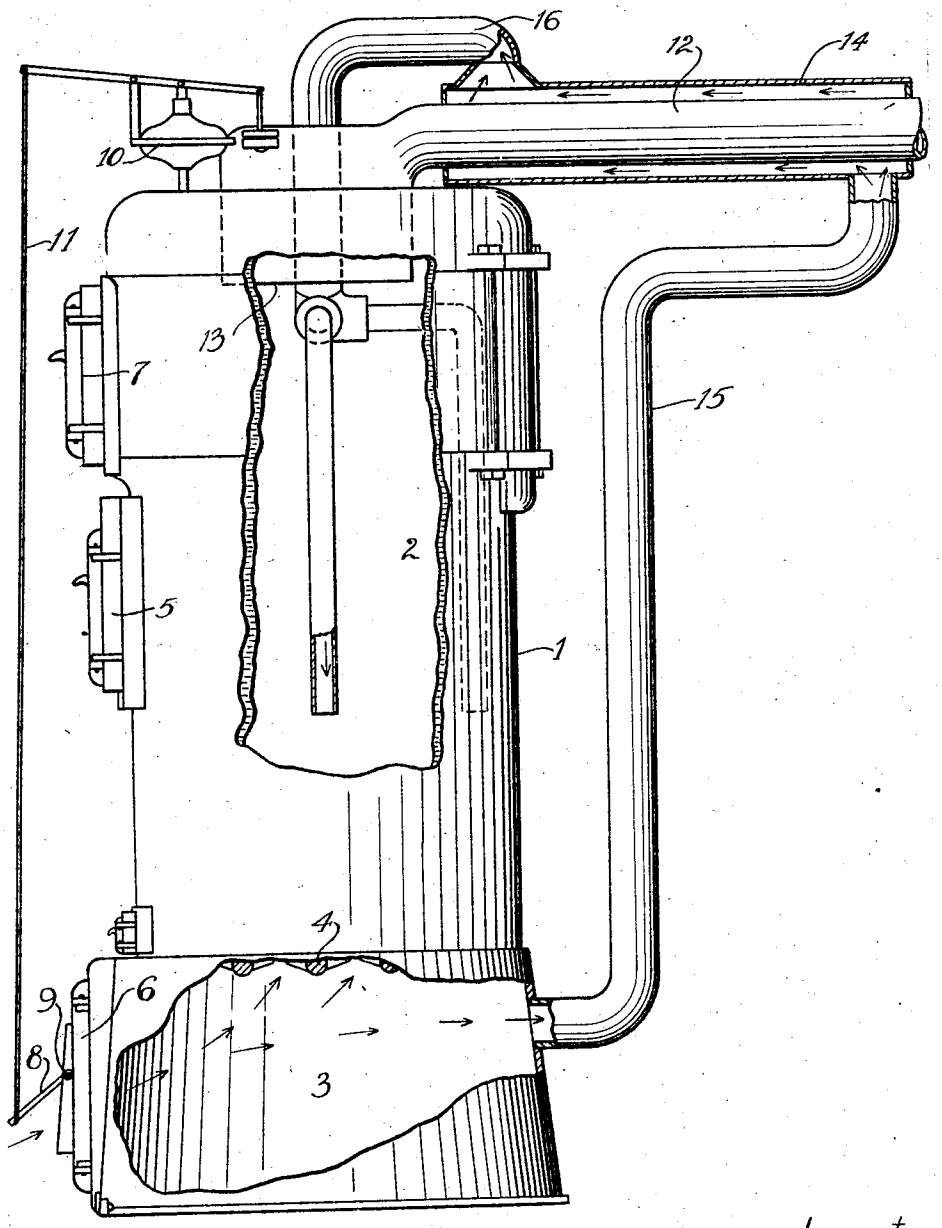
Sept. 13, 1927. 1,642,019

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FURNACE

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UNITED STATES PATENT OFFICE.

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FURNACE.

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This invention relates to heating devices and more particularly to an air heating appliance for stoves and furnaces designed for delivering a secondary air supply to or above the body of fuel on the grate.

The objects of the invention are to provide means for heating such secondary air supply with heat from the products of combustion after the same have left the furnace in order that the fire shall not become chilled as might be the case if the heating appliance were located in the furnace; and to provide for regulating the flow of air through said heating appliance either by means of the ashpit door or some other air inlet located in the ashpit and intended for regulating the draft through the fuel.

The drawing is diagrammatic, illustrating the air heating appliance partly in section, in connection with a furnace of known construction and shown partly broken away.

In its essential elements, the invention comprises an air drum surrounding the outlet flue of the furnace and having a supply conduit connecting it with the ashpit of the furnace, while the delivery conduit of the air heating drum enters the top of the furnace through the breeching or inner end of the outlet flue and terminates in a plurality of branch conduits having outlets near or slightly above the approximate fuel level intended to be maintained in the furnace. The advantage believed to accrue from this arrangement of air heating appliance is that the regulation of the air supply to the ashpit serves likewise to regulate the flow of air through the air heating appliance, air flowing through said appliance in proportion to the resistance it encounters therein, and the resistance encountered by the air which flows upwardly through the grate and fuel, both supplies of air being subject to the draft developed in the outlet flue or chimney. A further merit of the construction is believed to exist in an arrangement of air heating appliance for the secondary supply of air which utilizes some of the excess heat of the products of combustion which is not required for maintaining the necessary draft through the furnace. Due to not being located within the furnace proper, this air heating appliance does not chill the fire and thereby unnecessarily lower the possible efficiency of the furnace.

The drawing shows a cylindrical double wall boiler 1 divided into two parts; a fire-box 2 separated from an ashpit 3 by a grate 4. A firing door, ashpit door and clean-out door are respectively indicated at 5, 6 and 7. The flap 8 of the ashpit door is adjustable on its pivot 9 as usual for regulating the size of the air inlet to the ashpit. A diaphragm motor 10, subject to the pressure developed in the boiler, is arranged in a customary way for automatically raising and lowering the flap 8 through the connecting link 11.

The outlet flue 12 for the products of combustion, has an inlet 13 within the upper end of the furnace. An air heating drum 14 surrounds the outlet flue 12 and is connected by a conduit 15 with the ashpit. The outlet or delivery conduit 16 for the air heating drum connects the drum 14 with the fire-box portion of the furnace by passing downwardly through the center of the entrance 13 of the outlet flue. At its lower end, it preferably terminates in a plurality of branch passages which serve to deliver the heated air above the fuel bed near the walls of the furnace in order not to interfere with the firing operation and likewise to induce the most intense combustion along the heating surfaces of the furnace.

In the operation of the furnace, the flap 8 of the ashpit door is automatically raised and lowered by the motor 10 to control the rate of combustion and thereby maintain some desired pressure in the boiler. The air which enters the ashpit has two paths which it may travel; one upwardly through the grate and the fuel and out through the inlet 13 of the outlet flue, and the other path is through the conduit 15, air heating drum 14 and conduit 16, through the branch passages of which the air must travel before it is free to rise in the fire-box, and move out through the inlet 13 of the outlet flue.

It is well understood in this art that the fuel is most economically burned if a proper secondary supply of heated air is caused to combine with the gases at such rate that the furnace, as a gas consumer, will equal itself as a gas producer. The advantage of preheating the air, is the saving of gas which might otherwise be chilled to below the ignition point by the secondary supply of air. Much of the benefits of preheating the air is lost if the heat for such preheating is taken directly from the furnace. Accordingly, the air heating device of the present

invention is located beyond the furnace proper in position to extract part of the heat from the outlet flue for the products of combustion, which products are frequently of a higher temperature than that which is necessary to maintain the desired draft in the chimney.

Although but one specific embodiment of this invention has been herein shown and described, it will be understood that numerous details of the construction shown may be altered or omitted without departing from the spirit of this invention as defined by the following claims.

I claim:

1. The combination with a furnace structure providing a fire-box, an ashpit having an air inlet and an outlet, a grate, an outlet flue exterior to said furnace for carrying therefrom the products of combustion, of an air heating drum surrounding said outlet flue exterior to said furnace, an air supply conduit connecting said air heating drum with the said air outlet in said ashpit for conveying air from said ashpit to said air heating drum, and an air delivery conduit for conveying air from said air heating drum to said fire-box, which said air supply conduit together with said air heating drum and said air delivery conduit form one continuous air conduit exterior to said furnace having an inlet in the ashpit and having an outlet in the fire-box.

2. The combination with a furnace structure providing a fire-box, an ashpit having an air inlet and an outlet, a grate, an outlet flue exterior to said furnace for carrying therefrom the products of combustion, of an air heating drum surrounding said outlet flue exterior to said furnace, an air supply conduit connecting said air heating drum with the said air outlet in said ashpit for conveying air from said ashpit to said air heating drum, and an air delivery conduit for conveying air from said air heating drum to said fire-box, which said air supply conduit together with said air heating drum and said air delivery conduit form one continuous air conduit exterior to said furnace having an inlet located below the grate and having an outlet located above the grate.

3. The combination with a furnace structure providing a fire-box, an ashpit having an air inlet and an outlet, a grate, an outlet flue exterior to said furnace for carrying therefrom the products of combustion, of an air heating drum surrounding said outlet flue exterior to said furnace, an air supply conduit connecting said air heating drum with said air outlet in said ashpit for conveying air from said ashpit to said air heating drum, and an air delivery conduit for conveying air from said air heating drum to said fire-box, said air delivery conduit terminating in a plurality of branch passages having outlets near the surrounding wall of the fire-box but spaced a distance above the grate, which said air supply conduit together with said air heating drum and said air delivery conduit form one continuous air conduit exterior to said furnace having an inlet located below the grate and having an outlet located above the grate.

4. Controlled means to supply air to the ash pit of a fire box, means to control the flow of air from said ash pit and to direct a portion thereof to a heating device positioned outside the fire box and its combustion chamber, in combination with means to direct air from said heating device to said fire box and discharge the same above the bed of fuel on the grate thereof, said means to control said flow from said ash pit arranged to automatically direct a quantity of air therefrom corresponding with the varying resistance to the flow of air through the fuel on said grate, and said means to direct the flow of air from said heating device arranged to automatically discharge the air flowing therethrough.

Signed at Chicago this 25 day of Oct., 1920.

IRA W. FOLTZ.