Aug. 24, 1926. 1,596,922

J. R. CLEVENGER ET AL

FURNACE

Filed May 9, 1925

Fig. 1.

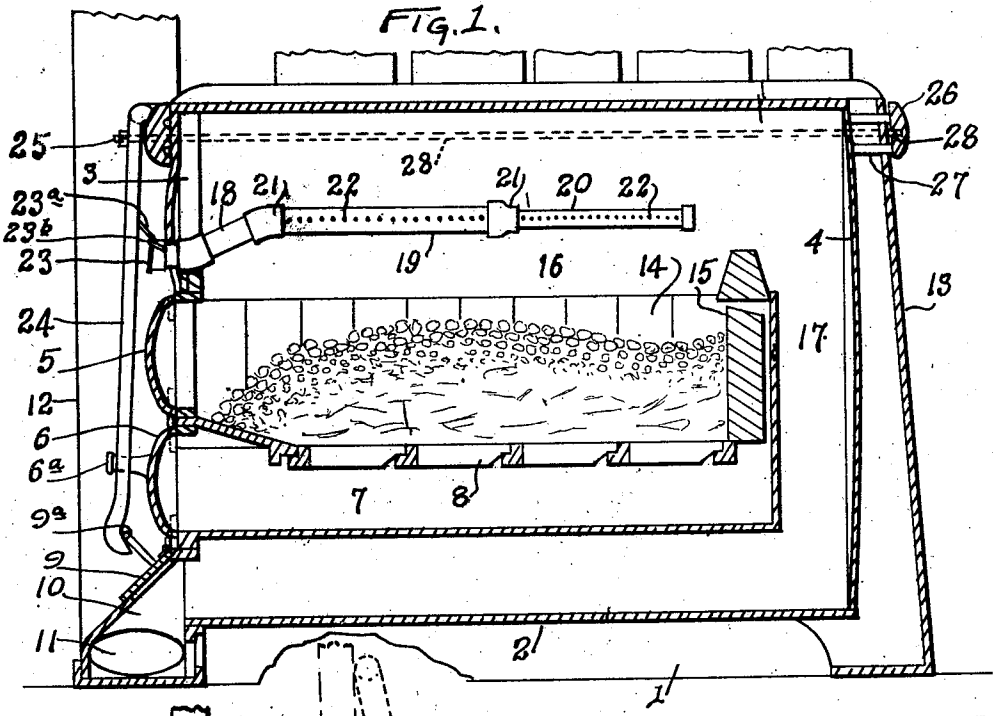


Fig. 2.

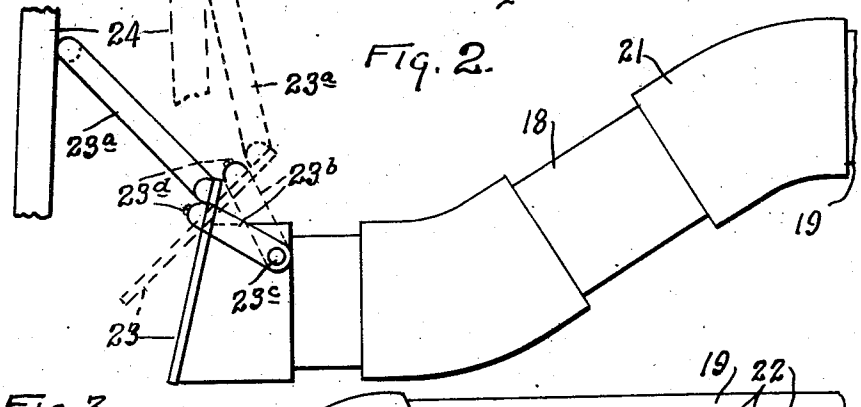
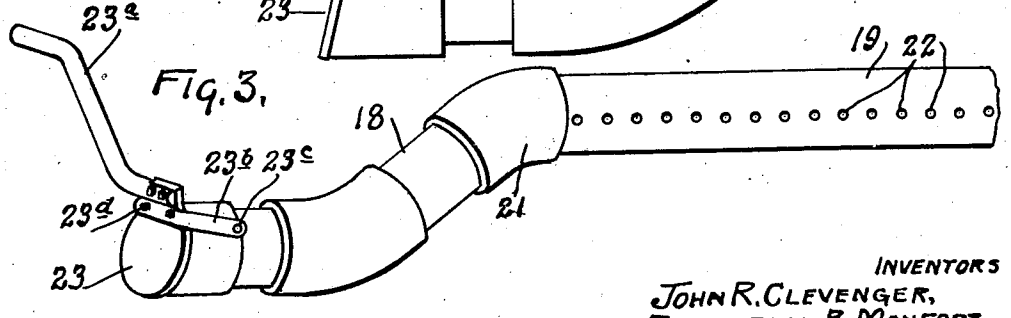


Fig. 3.



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Patented Aug. 24, 1926. 1,596,922

UNITED STATES PATENT OFFICE.

JOHN R. CLEVENGER AND RUTHERFORD B. MONFORT, OF WILMINGTON, OHIO, ASSIGNORS TO THE FARQUHAR FURNACE COMPANY, OF WILMINGTON, OHIO, A CORPORATION OF OHIO.

FURNACE.

Application filed May 9, 1925. Serial No. 29,056.

This invention relates to improvements in furnaces, particularly of the types used in heating residences.

The invention is in the nature of an improvement on the furnaces set forth in Letters Patent No. 923,346, dated June 1, 1909, for self-regulating furnaces, issued upon the application of Milton J. Farquhar and Henry B. Farquhar, assignors to The Farquhar Furnace Company of Wilmington, Ohio, our assignee of this present invention.

The object of the present improvements is to supply an additional and regulated quantity of air to the combustion chamber and above the fire box of the furnace set forth in said patent, such additional supply to be afforded at the time when the draft door of the furnace is closed to the exclusion of the admission of air into that part of the furnace. But it is to be understood that the present invention is not limited in its use to supplying such quantities of air to the combustion chamber at that particular time.

The purpose is to automatically introduce into the combustion chamber of the furnace regulated quantities of air to furnish the requisite amount of oxygen to mix with the gases of combustion arising from the fuel in the fire box to cause such gases to be completely consumed, and incidentally more or less of the smoke to be also consumed. This results in increasing the heat without increasing the consumption of the solid fuel.

In the accompanying drawings:

Figure 1 is a vertical longitudinal sectional view of a furnace of the type described and set forth in said Patent No. 923.346.

Figure 2 is an enlarged side elevation of the air conduit, its valve and a part of the means for operating the valve.

Figure 3 is a perspective view of the air conduit, its perforated or distributing section, and its valve.

Referring to the drawings in detail, the numeral 1 designates the shell or casing of a domestic or house-warming furnace of the general type set forth in said Patent No. 923,346. This casing forms an enclosure made of side walls designated 2 which as they come together at their upper and lower edges thereby also form the top and bottom portions of this general type of furnace. The casing further comprises a head or front wall 3 and a rear wall 4. The front wall 3 is equipped with a door 5 for the introduction of fuel such as coal or wood, and a draft door 6 which when open permits a draft of air to enter the chamber 7 to work itself thence between the grate bars 8 and the mass of fuel to excite and support combustion. Ashes gather in the chamber 7 and may be readily removed therefrom through the opening of door 6.

The lower part of the front wall 3 has an opening closed by a draft-check door 9 which when opened admits air into the smoke passage 10 and the smoke flue 11 with the effect of checking the draft or cooling down the furnace somewhat. The flue 11 connects with a smoke pipe 12 which in turn extends to the chimney of the building.

At the rear a further wall 13 is provided to form a sort of enclosure for the wall 4 of the combustion chamber.

It will now be observed that within the casing is a fire box generally indicated at 14 with a baffle wall 15, a combustion chamber generally indicated at 16, and a down flue 17 leading into the smoke passage 10.

Within this combustion chamber we extend and position our air distributor composed of an inlet pipe section 18 and distributing sections 19 and 20 united by suitable couplings 21. These sections are made of pipe of the same or different diameters and are perforated as indicated at 22 for the issuance of streams of air admitted into the section 18 when the valve 23 is open. The draft of the furnace draws the air into and through the distributor and causes the issuance of the air out of the perforations of which there may be as many and as many rows thereof as desired. The oxygen thus supplied unites with the gases arising from the combustion of the solid fuel and forms a gaseous fuel by which the otherwise waste gases, and by which also more or less of the smoke, are consumed, adding to the heat of the furnace without additional cost of fuel.

We provide any suitable means for opening the valve 23 to admit air to the distributor when the air draft door or control is closed, and for closing the distributor valve when the air draft door or control is open. This is done because there is a sufficient supply of air when the passage 7 is receiving air, as when the door 6 is open, but when

this is closed the distributor valve opens and permits the supply of air to the combustion chamber 16.

One means for thus automatically opening and closing the distributor valve consists of an actuating bar 24 hung loosely near the top of the furnace on a bolt or pin 25. This bar is to be adjusted outward and inward so that by an outward movement it will open the door 6 by contact with the projection 6^a thereof, and by an inward movement it will contact with the lever arm 23^a of the distributor valve so as to open it. A further movement of the bar will cause it to contact with the projection 9^a of the door 9 to lift it and permit an indraft of air to check the too rapid burning of the fuel.

The means for so actuating the bar 24, which is a valve and door operating device, is that set forth in said patent No. 923,346. Briefly these means consist of a cross strip or plate 26 located at the rear of the furnace and having pins 27 which connect with the rear furnace wall 4. When this wall expands or contracts, according to the heat, it adjusts the plate and its pins rearwardly or forwardly. The plate is connected by a longitudinal rod 28 with the bar 24, so that if the heat rises above a general normal for which the furnace is adjusted, the bar 24 will open the valve 23 and maintain it open, while if the heat drops below such normal then the bar 24 will be adjusted outward from the furnace and by contacting with the projection 6^a will open the door 6 and admit a draft of air to the grate bars to accelerate the fire. When the heat comes back to substantially normal the bar 24 will move back in the direction of the furnace and cause or permit the door 6 to close. If the heat still continues to be excessive the bar will act on the projection 9^a and open the check door 9. At such time as the bar 24 releases the door 6 the distributor valve is opened; or, indeed, at such time as the check door 9 is opened, the valve 23 is also opened.

Such is the preferred mode of operation, though it is to be understood that in so far as concerns the combination of our air distributor with the fire box and combustion chamber of the furnace, the particular time and order of opening and closing the distributor valve is not to be regarded as a limitation.

Referring to Figure 2 it will be observed that the valve 23 is shown closed in full line position and open in dotted line position, the two positions of the actuating bar 24 being also indicated in this enlarged scale in Figure 2, as also the two positions of the valve lever arm 23^a. The valve is hinged to the distributor by means of a link 23^b pivoted to the distributor at 23^c and secured to the valve as by screws 23^d.

It will now be seen that we have provided means for automatically admitting a supply of air from the outside of the furnace into the combustion chamber thereof, and for distributing the air in the chamber in a manner to permit of furnishing a regulated quantity of oxygen for admixture with the gases arising from the combustion of the fuel, so as to create a gaseous fuel to increase the heat in the furnace without using additional quantities of purchasable fuel. Also, that we have shown one means for automatically opening and closing the valve of the air distributor. We have found from use that the invention here described operates successfully and efficiently and produces results valuable to the user of the furnaces.

Having thus fully described our invention, what we claim as new and desire to secure by Letters Patent, is:

In a furnace, a combination with a fire box having grate bars and a combustion chamber, of an air distributor comprising a horizontal perforated pipe extending through the furnace wall and located in the combustion chamber and over the fire box, and adapted to deliver air through the perforations into the products of combustion arising in the chamber, a valve for the distributor located outside of said chamber, a draft door and a chamber beneath the grate bars, and means for alternately opening and closing said valve and said door comprising an actuating bar also located outside of the furnace and adapted to contact with and open the valve when moved in one direction, and to contact with and open said door when moved in the other direction, an expanding and contracting part of the furnace itself, a plate connected thereto, and a connection between such plate and actuating bar to give the bar said movements.

In testimony whereof we affix our signatures.

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