May 10, 1949. E. M. FRANKLIN 2,469,639

MAGAZINE DOWNDRAFT FURNACE

Filed Nov. 23, 1945

Fig. 1.

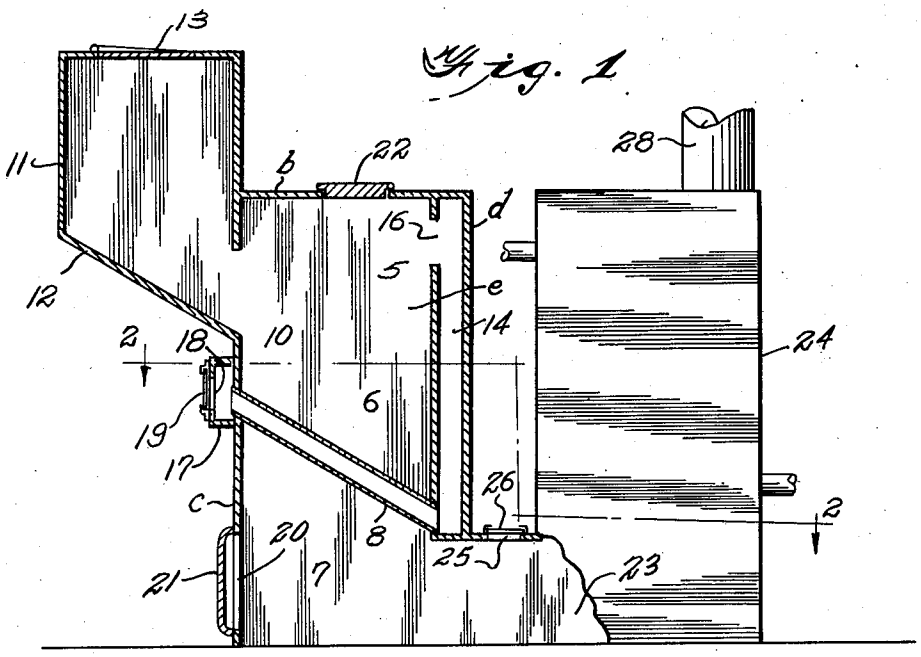
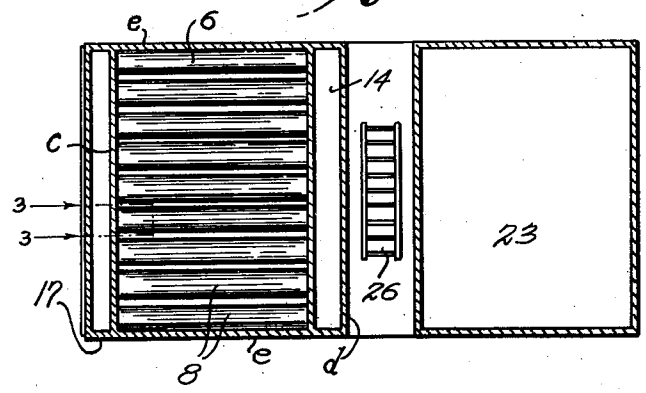


Fig. 2.



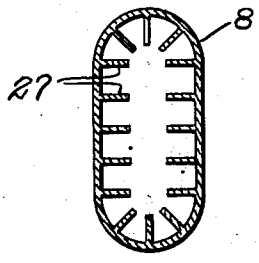


Fig. 3.

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Patented May 10, 1949

2,469,639

UNITED STATES PATENT OFFICE

2,469,639

MAGAZINE DOWNDRAFT FURNACE

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Application November 23, 1945, Serial No. 630,248

4 Claims. (Cl. 110—29)

1

This invention relates to stove or furnace construction of the type disclosed in my U. S. Letters Patent, No. 2,382,785, dated August 14, 1945.

The primary object of the present invention is to simplify and improve the operation of the stove or furnace construction disclosed in my above-named patent.

The exact nature of the present invention, as well as more specific objects and features thereof, will become apparent from the following description when considered in connection with the accompanying drawing, in which:

Figure 1 is a view, partly in side elevation, and partly broken away and in vertical section, of a stove or furnace constructed in accordance with the present invention.

Figure 2 is a horizontal section taken on line 2—2 of Figure 1.

Figure 3 is an enlarged transverse section through one of the grate bars, taken on line 3—3 of Figure 2.

Referring in detail to the drawing, 5 indicates a down draft chamber rising from a fire-box 6, under which is located an ash pit 7. A grate is provided in the fire-box including a plurality of hollow open-ended grate bars 8 which are inclined rearwardly and downwardly. The bottom of the chamber 5 is open and communicates with the fire-box. The furnace proper has a top wall b, a front wall c, a rear wall d, and side walls e.

An opening 10 is provided in the front of the chamber 5 near its lower end and directly above the grate bars 8, and this opening constitutes a fuel inlet leading from a hopper 11 whose inclined bottom wall 12 terminates flush with the bottom of the opening 10. The hopper 12 has an airtight lid 13, and it will be seen that the fuel may feed by gravity from the hopper 11 through the opening 10 onto the inclined grate bars. It will also be evident that as fuel is consumed it will move downwardly and rearwardly by gravity on the grate to the rear portion thereof, and additional fuel will be admitted from the hopper 11 as the consumption of fuel on the grate proceeds.

Provided at the back of the draft chamber 5 and fire-box 6 is an air flue 14. The rear ends of the grate bars 8 open through the rear of the chamber 5 into the lower end of the air flue 14.

Flue 14 has a top air outlet 16 constituting an air admission opening for the chamber 5 at the top of the latter.

Extending across the front of the fire-box 6 is a housing 17 into which the front ends of the grate bars 8 open. The housing 17 has a front air

2

admission opening 18 controlled by a suitable damper 19. The ash pit 7 has a clean-out opening 20 closed by a door 21, while the draft chamber 5 has a suitable airtight removable lid 22. Disposed rearwardly of and communicating with the ash pit 7 is a secondary combustion chamber 23 that leads to the bottom of a heat exchanger 24 disposed rearwardly of and spaced from the flue 14. Between the flue 14 and the heat exchanger 24, the top of the combustion chamber 23 is provided with an air inlet opening 25 controlled by a damper 26 and by means of which additional air may be admitted to the combustion chamber 23. As shown clearly in Figure 3, the grate bars 8 are preferably in the form of elongated hollow tubes having internal heat radiating or dissipating fins 27.

In operation, outside air is admitted to housing 17 and passes rearwardly through the grate bars 8 for cooling the latter and for preheating the air. Thus, preheated air is discharged from the grate bars 8 into the lower end of the flue 14, and it then flows upwardly and discharges from the flue 14 into the top of the chamber 5. The preheated air then passes downwardly in the chamber 5 and through the bed of coals, thereafter passing downwardly between the grate bars into the ash pit 7. From the ash pit 7, the products of combustion pass to the secondary combustion chamber 23 where combustion is completed by supplying additional air to the products of combustion and unburned fuel or gasses entrained therein, such additional air being supplied through the opening 25. The hot products of combustion from the fire-box and the chamber 23 are utilized to generate useful heat by passing them through the heat exchanger 24 in passing to the smoke stack or chimney 28. It will be noted that the preheated air passing downwardly in the chamber 5 is supplied in such a manner as to burn the fuel from top to bottom of the fire bed, and when the products of combustion leave the fire-box they pass through the ash pit 7 to the combustion chamber 23 where combustion is completed by supplying additional air through the opening 25. Preheated air that cools and passes through the grate bars is supplied to the fuel above the grate, and the additional air for the secondary combustion chamber is supplied from the outside and not from the grate bars. This difference in construction, as compared to that of my above-mentioned patent, enables the construction of the stove or furnace to be greatly simplified and considerably improves the operation of the stove or furnace. The

amount of air admitted to the housing 17 and to the chamber 23 may be regulated by adjusting the dampers 19 and 26 so that maximum efficiency is had under different conditions. As the fuel is consumed, it moves downwardly along the inclined grate bars so that additional fuel will be supplied from the hopper 11 by gravity to keep a bed of substantially uniform relatively shallow depth on the grate.

From the foregoing description, it is believed that the construction, operation and advantages of the present invention will be readily understood and appreciated by those skilled in the art. Minor changes may be made in details of construction, such as fairly fall within the scope of the invention as claimed.

I claim:

1. In a stove or furnace construction, a fire-box having a grate therein, said grate including rearwardly and downwardly inclined grate bars consisting of open-ended tubular members having their forward upper ends opening through the front of the fire-box for the admission of outside air thereto, an ash pit below the grate and fire-box, means forming a combustion chamber rearwardly of the ash pit and communicating with the latter below the grate, means forming a down draft chamber rising from the fire-box and having an opening in the upper portion of the rear wall thereof, an air flue at the back of said downdraft chamber communicating at its upper end with the top of said downdraft chamber through said opening, said grate bars opening at their rear lower ends into the bottom of said air flue, said downdraft chamber having an opening in the front wall thereof for the inlet of fuel directly above the grate, and a feed hopper for the fuel communicating at its bottom with said fuel inlet opening and adapted to feed the fuel onto the grate as the fuel is consumed on the latter.

2. In a stove or furnace construction, a fire-box having a grate therein, said grate including rearwardly and downwardly inclined grate bars consisting of open-ended tubular members having their forward upper ends opening through the front of the fire-box for the admission of outside air thereto, an ash pit below the grate and fire-box, means forming a combustion chamber rearwardly of the ash pit and communicating with the latter below the grate, means forming a down draft chamber rising from the fire-box and having an opening in the upper portion of the rear wall thereof, an air flue at the back of said downdraft chamber communicating at its upper end with the top of said downdraft chamber through said opening, said grate bars opening at their rear lower ends into the bottom of said air flue, said downdraft chamber having an opening in the front wall thereof for the inlet of fuel directly above the grate, a feed hopper for the fuel communicating at its bottom with said fuel inlet opening and adapted to feed the fuel onto the grate as the fuel is consumed on the latter, a housing extending across the front of the fire-box and having an air inlet opening in the front thereof, and a damper controlling said air inlet opening, said grate bars communicating at their forward ends with said housing.

3. In a stove or furnace construction, a fire-box having a grate therein, said grate including rearwardly and downwardly inclined grate bars consisting of open-ended tubular members having their forward upper ends opening through the front of the fire-box for the admission of outside air thereto, an ash pit below the grate and fire-box, means forming a combustion chamber rearwardly of the ash pit and communicating with the latter below the grate, means forming a down draft chamber rising from the fire-box and having an opening in the upper portion of the rear wall thereof, an air flue at the back of said downdraft chamber communicating at its upper end with the top of said downdraft chamber through said opening, said grate bars opening at their rear lower ends into the bottom of said air flue, said downdraft chamber having an opening in the front wall thereof for the inlet of fuel directly above the grate, a feed hopper for the fuel communicating at its bottom with said fuel inlet opening and adapted to feed the fuel onto the grate as the fuel is consumed on the latter, and means for controlling the admission of air to the forward ends of said grate bars.

4. In a stove or furnace construction, a fire-box having a grate therein, said grate including rearwardly and downwardly inclined grate bars consisting of open-ended tubular members having their forward upper ends opening through the front of the fire-box for the admission of outside air thereto, an ash pit below the grate and fire-box, means forming a combustion chamber rearwardly of the ash pit and communicating with the latter below the grate, means forming a down draft chamber rising from the fire-box and having an opening in the upper portion of the rear wall thereof, an air flue at the back of said downdraft chamber communicating at its uper end with the top of said downdraft chamber through said opening, said grate bars opening at their rear lower ends into the bottom of said air flue, said downdraft chamber having an opening in the front wall thereof for the inlet of fuel directly above the grate, a feed hopper for the fuel communicating at its bottom with said fuel inlet opening and adapted to feed the fuel onto the grate as the fuel is consumed on the latter, means forming a secondary combustion chamber rearwardly of and communicating with the ash pit below the grate, said secondary combustion chamber having a top air inlet opening behind said air flue, and means controlling the admission of outside air to said secondary combustion chamber through said top opening of the latter.

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