

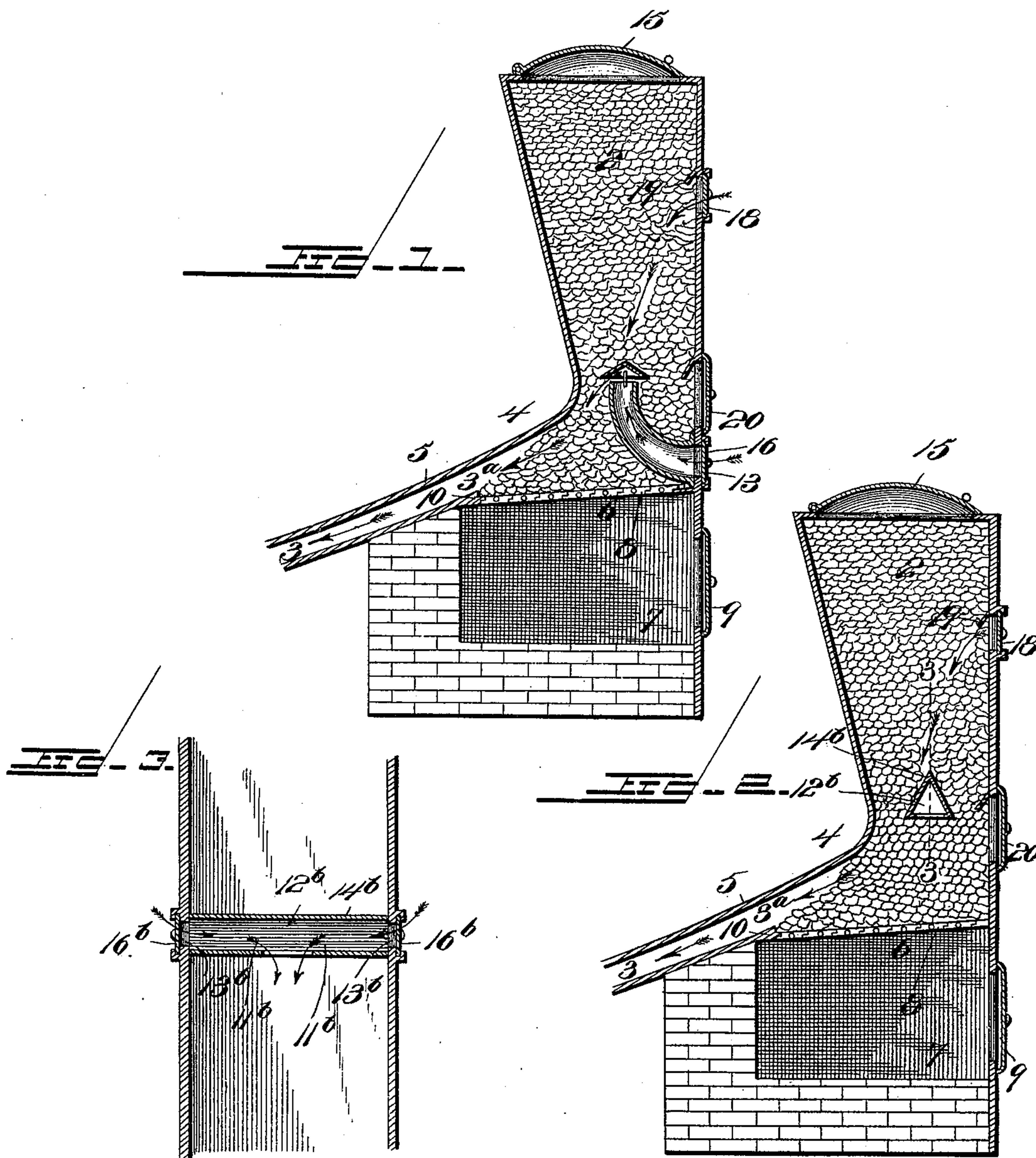
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Patented Feb. 21, 1899.

E. M. WASHBURN.
FURNACE.

(Application filed Oct. 23, 1897.)

(No Model.)



Witnesses

F. Kiser,

D. J. Mohaupt.

Edwin M. Washburn, Inventor,

By His Attorneys,

C. A. Snow & Co.

UNITED STATES PATENT OFFICE.

EDWIN M. WASHBURN, OF HILLSDALE, MICHIGAN.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 619,852, dated February 21, 1899.

Application filed October 23, 1897. Serial No. 656,197. (No model.)

To all whom it may concern:

Be it known that I, EDWIN M. WASHBURN, a citizen of the United States, residing at Hillsdale, in the county of Hillsdale and State of Michigan, have invented a new and useful Furnace, of which the following is a specification.

My invention relates to heating devices, and particularly to stoves, furnaces, steam and hot-water boiler heaters, and analogous devices adapted for burning solid fuel, such as coal; and the objects in view are to provide draft-supplying means whereby smoke, gas, and other products of combustion are carried downwardly through the incandescent fuel on their way to the outlet-flue and also to provide such an arrangement of draft-inlet openings as to cause the coking of coal previous to the consumption thereof.

Further objects and advantages of this invention will appear in the following description, and the novel features thereof will be particularly pointed out in the appended claims.

In the drawings, Figure 1 is a vertical sectional view of a furnace constructed in accordance with my invention, showing a preferred arrangement of main draft-inlet. Fig. 2 is a similar view showing a modified arrangement of the main draft-inlet. Fig. 3 is a transverse vertical section of a portion of the furnace on the line 3 3 of Fig. 2 to show the modified draft-inlet in longitudinal section.

Similar numerals of reference indicate corresponding parts in all the figures of the drawings.

A furnace embodying the essential features of my invention is adapted to be arranged to suit the various uses of heating devices of this class; but as a means of showing the principles of the preferred construction it will be sufficient to illustrate only one embodiment, wherein the combustion-chamber or fire-box 1, the magazine 2, and the smoke or draft flue 3 have a rear wall 5, adapted for radiating or other purposes. The smoke or draft flue may, as shown, decline rearwardly and downwardly from the fire-box, but it must have communication with the fire-box at or contiguous to its bottom or contiguous to the plane of the grate 6, which is

non-ventilated and is of the reversible or dumping type to provide for dropping the ashes, cinders, or other waste into an ash-pit 7. In the construction illustrated this grate consists of a plurality of transverse tilting grate-bars 8, having contiguous interlocking edges formed by reversely rabbeting said edges, and it will be seen that when the grate-bars are in their normal positions draft is excluded from the fire-box from below, the ash-pit as a further security against the inlet of air being provided with a door 9. This construction of grate is shown merely to illustrate the fact of its non-ventilated feature, and it will be understood that any dumping or non-dumping grate of non-ventilated construction may be substituted for that shown. A transverse guard 10, consisting of an upward enlargement of the floor of the fire-box in rear of the grate, is arranged at the contiguous end of the smoke or draft flue to contract the throat 3^a thereof, and thereby prevent fuel from passing from the fire-box into the flue when the latter declines, as shown in the drawings.

As above indicated, the smoke or draft flue communicates with the fire-box contiguous to the plane of the non-ventilated grate, and hence in order to admit draft to the fire-box at such a point as to cause the air thus entering to pass through the incandescent body of coals or other fuel in the fire-box I provide a main draft-inlet 11, located above the plane of the grate and preferably in a reduced portion or throat 1^a of the fire-box, said draft-inlet being damper-controlled to provide for admitting the desired quantity of air for the usual purpose. Various means may be employed for thus admitting draft to the fire-box at a point above the main body of its incandescent contents to supply the necessary air to support combustion, and in Fig. 1 the means shown consist of a conductor 12, communicating with an opening in a wall of the fire-box, such as the front opening 13, and having its upturned discharge end (which is arranged contiguous to the throat of the fire-box) protected by a double inclined or hipped guard 14 to prevent fuel introduced into the magazine through the opening controlled by the fuel-door 15 from falling into the conductor, and thus obstructing the passage of

air. The above-described construction of guard also prevents the lodgment of coal or other fuel thereon. The damper 16, which I employ for controlling this main draft-inlet, as illustrated in Fig. 1, is preferably arranged at the inlet end of the conductor 12, for the reason that when thus located it is within convenient reach for adjustment, and it will be understood that both in its location and construction the draft-controlling damper is susceptible of variations, whereby it may be suited to the special arrangement of the other parts of the furnace or heating device in connection with which it is used.

In Fig. 2 I have shown a modified construction and arrangement of damper-controlled main draft-inlet, consisting of a substantially horizontal conductor 12^b, communicating at its ends with openings 13^b in the side walls of the fire-box and fitted with dampers 16^b, the center of the conductor being cut away at its lower side to provide discharge ends or mouths 11^b, which form the draft-inlet openings and which are located at an intermediate point between the front, rear, and side walls of the fire-box and are protected from falling fuel by the remaining upper side of the conductor, which constitutes a guard 14^b, spanning said draft-inlet openings. This conductor may in practice have any desired cross-sectional shape, as round, square, triangular, &c., Fig. 2 showing the triangular shape and having the advantage of preventing fuel placed in the magazine from lodging thereon.

By admitting draft at a point above the plane of the grate, while the communicating smoke or draft flue has its throat located contiguous to the plane of the grate, I produce a downward draft through the incandescent contents of the fire-box instead of an upward draft, as in the ordinary practice, and hence the natural tendency of smoke, gases, and other products of combustion to rise after leaving the point of combustion is overcome, and said products are forced to descend and pass through the contents of the fire-box, thus exposing them to the burning fuel and accomplishing their complete consumption. I have found, however, that the attainment of this object is facilitated and the additional advantage of coking the fuel before the actual burning thereof may be attained by providing an additional or auxiliary draft-inlet 17, located above the plane of the main draft-inlet and provided with a controlling-damper 18 and a guard 19 to prevent the fuel from escaping at this point when the damper is open. Air admitted through the auxiliary inlet thus approaches the contents of the fire-box in a downward direction and all of the smoke, gas, and other products of combustion, as well as the gas thrown off by the coking of fuel in the magazine, are drawn downwardly, as indicated by the arrows in the drawings, and through the incandescent contents of the fire-box. Obviously this introduction of combustible gases into the fire-box vastly increases the resultant

heat of the furnace and has the additional advantage of utilizing to the maximum extent the inherent heating qualities of the fuel employed. Thus the essential feature of the device embodying my invention resides in the fact that the smoke or draft flue communicates with the fire-box at or contiguous to the plane of its bottom, said bottom being preferably fitted with or consisting of a non-ventilated grate, and draft-inlet openings or conductors communicating, respectively, with the fire-box contiguous to the point of combustion and between the front, rear, and side walls thereof and with the magazine above the plane of the point of combustion to insure a downward draft from said points of inlet through the incandescent body of coals to the outlet or draft flue. The main or lower draft-inlet provides for supplying air at such a point as to insure the complete combustion of fuel, together with gas and other products of combustion, as well as the coked fuel as it descends from the magazine, while the upper draft-inlet (and it will be understood that the air for supplying these draft-inlets may be drawn from any suitable source outside of the heating device or otherwise) induces the necessary downward draft through the contents of the magazine to insure the convection of all the gaseous products of combustion in a downward direction through the incandescent body of fuel.

In practice the initial fire is prepared in the fire-box by suitable kindling being introduced through the opening controlled by the fire-door 20, said door being preferably provided with a guard 21, and subsequently the magazine is charged by fuel introduced through the fuel-door opening at the upper end of the magazine.

Various changes in the form, proportion, and the minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of this invention.

Having described my invention, what I claim is—

1. A furnace having a non-ventilated grate, a smoke or draft flue communicating with the fire-box at its lowermost point, and a draft-inlet conveyer, having its discharge-opening located above the plane of the communicating end of said flue, and at an intermediate point between the front, rear and side walls of the fire-box, substantially as specified.

2. A furnace having its fire-box provided with a non-ventilating grate, a smoke or draft flue communicating with the fire-box contiguous to the plane of the grate, and a damper-controlled draft-inlet located at an intermediate point between the front, rear, and side walls of the fire-box and above the plane of the communicating end of said flue, said draft-inlet communicating by means of a conveyer with an opening in a wall of the fire-box, substantially as specified.

3. A furnace having a fire-box provided

with a non-ventilating grate and having a superjacent communicating fuel-magazine, a smoke or draft flue communicating with the fire-box contiguous to the plane of the grate, a draft-inlet conveyer communicating with a damper-controlled opening in a wall of the fire-box and terminating at an intermediate point between the front and rear walls of the fire-box, and above the plane of the communicating end of the said flue at the point of communication of said magazine with the fire-box, and an inclined guard covering the discharge end of said conveyer, substantially as specified.

4. A furnace having its fire-box provided with a non-ventilating grate and a contracted throat, a draft or smoke flue communicating with the fire-box at a point contiguous to the plane of the grate, a damper-controlled main draft-inlet conveyer communicating with the fire-box above the plane of the communicating end of said flue, and in the plane of said throat, and at an intermediate point between the front, rear, and side walls thereof, and a fuel-magazine rising from and communicating with the throat of the fire-box, and provided, above the main draft-inlet, with an auxiliary damper-controlled draft-inlet, substantially as specified.

5. A heating device having a fire-box provided with a closed bottom consisting of a non-

ventilated grate, and a communicating superjacent fuel-magazine, said fire-box and magazine being provided respectively with draft-inlets, located in different horizontal planes, the draft-inlet of the fire-box consisting of a conveyer of which the discharge end is located at the point of communication of the fuel-magazine with the fire-box and in the path of fuel descending from the fuel-magazine, and a draft-outlet communicating with the fire-box at a point below the plane of the lower or fire-box draft-inlet, substantially as specified.

6. A heating device having its fire-box provided with a closed bottom and an elevated draft-inlet, and a draft-outlet communicating with the fire-box below the plane of said elevated draft-inlet, and a fuel-magazine communicating with the fire-box approximately in the plane of and surrounding the discharge-opening of said draft-inlet, and provided above said point of communication with a second draft-inlet, substantially as specified.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

EDWIN M. WASHBURN.

Witnesses:

E. J. MARCH,
F. W. ELLIOTT.