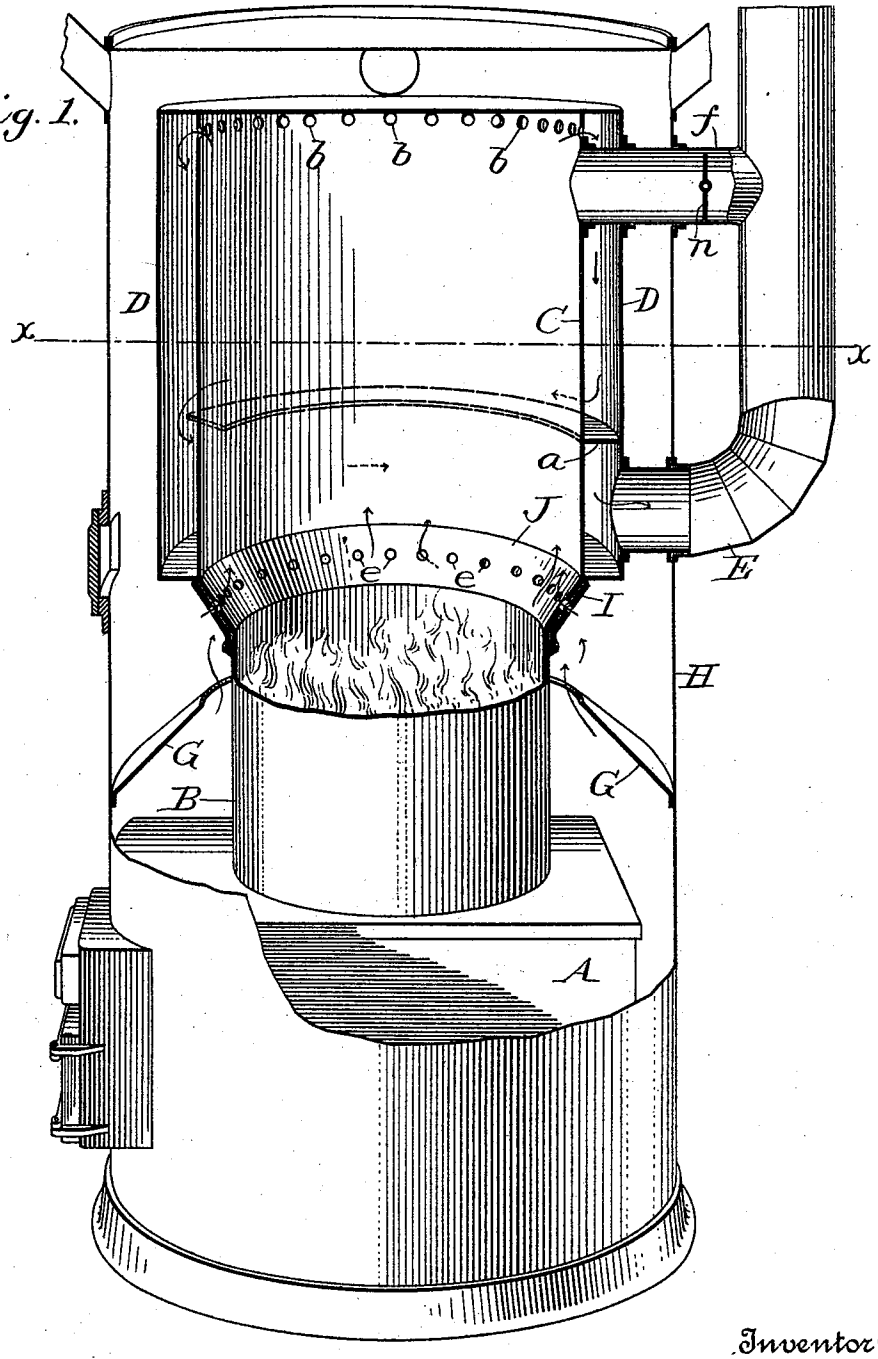
(No Model.) 2 Sheets—Sheet 1.

E. BETZ.

HOT AIR FURNACE.

No. 568,730. Patented Oct. 6, 1896.

Fig. 1.



Witnesses
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(No Model.) 2 Sheets—Sheet 2.

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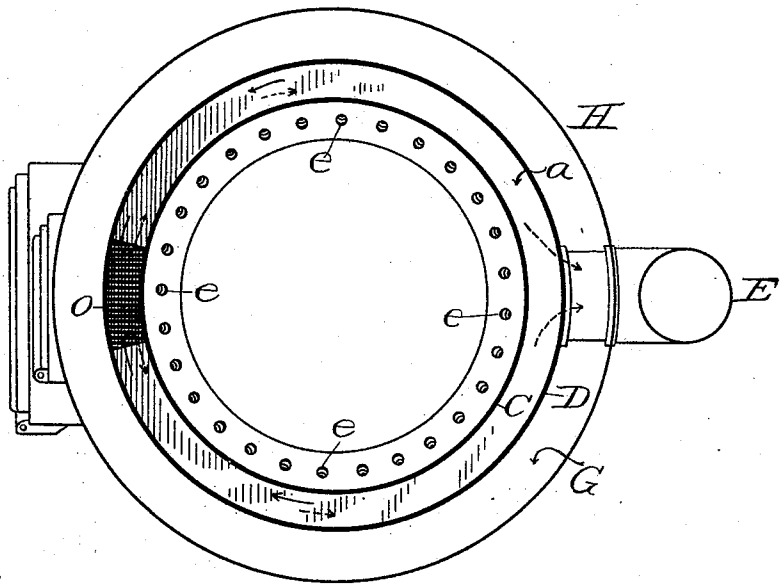
Fig. 2.



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UNITED STATES PATENT OFFICE.

ERNEST BETZ, OF WASHINGTON, DISTRICT OF COLUMBIA.

HOT-AIR FURNACE.

SPECIFICATION forming part of Letters Patent No. 568,730, dated October 6, 1896.

Application filed March 2, 1896. Serial No. 581,598. (No model.)

To all whom it may concern:

Be it known that I, ERNEST BETZ, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Hot-Air Furnaces, of which the following is a specification.

My invention relates to hot-air furnaces; and the invention consists in the peculiar construction of the combustion-chamber and radiating-drum by which the gases are more completely consumed and the heat more efficiently utilized, all as hereinafter more fully set forth.

Figure 1 is a perspective elevation, partly in section, to more fully illustrate the construction; and Fig. 2 is a horizontal section on the line *x x* of Fig. 1, looking from above downward.

The object of my invention is, primarily, to secure a more complete utilization of the fuel and a more even or uniform distribution of the heat to all parts of the heating-drum, and consequently to all the hot-air pipes leading from the inclosing case to the various rooms. To accomplish these results, I construct the furnace as shown in Fig. 1, in which A represents the lower portion, which contains the ash-pit and the grate, and B the fire-pot, the grate being located at the base of the latter, as usual, and therefore not necessary to show or describe. At its top the fire-pot B is provided with a laterally-projecting flange J, which may be inclined, as shown, or which may project at a right angle, as may be most convenient to manufacture. This flange J is perforated with a series of small holes *e*, as shown in Fig. 1, for the admission of air, and it is provided with a movable ring I, provided with a corresponding series of holes, so that by moving the ring the admission of air can be regulated as desired, or can be entirely shut off when starting a fire. It will be observed that these air-inlets are located at the top of the fire-pot, the object being to introduce the air in small jets all around at a point above the fuel, so as to insure a thorough admixture of the air with the hot gases and smoke as they arise from the fuel, and thereby insure a complete combustion of the gases and prevent almost wholly, if not entirely, the escape from the furnace of any smoke, as it is well known that smoke is simply the result of imperfect combustion.

In order to still further aid in the combustion of the gases, I locate over the fire-pot a large combustion-chamber in the form of a drum C, which is closed at its top, but which has a series of holes *b* through its side walls extending entirely around it and at uniform distances apart, as shown in Fig. 1, they being located at any desired point vertically. In the drawings I have shown them as being near the top; but, if desired, they may be located at a lower point. As, however, this drum is large in comparison to the size of the fire-pot I find by experiment that with the hole located as shown, and with the air-inlets arranged all around at the top of the fire-pot, the air and gases become thoroughly intermingled and the gases consumed before escaping at the holes *b*. Over or around this drum C, I place another drum, D, closed at top and bottom and having no outlet except at the smoke-pipe E, which is connected to the drum D at or near its lower end, as shown. In the space between these two drums I arrange an annular diaphragm *a*, as shown in Figs. 1 and 2. This diaphragm, as shown in Fig. 2, extends nearly around the drum C, there being at the front an opening O of an area equal to that of the smoke-pipe or a little more.

With these parts thus constructed it will be seen that the products of combustion will first pass uniformly all around through the holes *b*, thence downward between the two drums and around to the front, thence down through the opening O in the diaphragm at the front, where they will divide and pass on both sides around through the lower space to the smoke-pipe. By this arrangement, as will be seen, the heated products of combustion are distributed uniformly to all parts of the heating-drum D and are prevented from reaching the smoke-pipe until all or nearly all the heat has been extracted therefrom.

In order to provide a direct draft, as is necessary or desirable when starting a fresh fire, I extend a branch pipe from the drum C directly to the smoke-pipe F and provide it with a damper *n*, by which to close it after the fire has got well under way.

The furnace will be inclosed with a case or jacket H, which in the ordinary sizes will be made of sheet-iron, the larger sizes preferably of brick. In order to bring the inflowing cold air into close contact with the fire-pot and prevent it from passing directly upward near the outer wall of the case, as it otherwise might, I arrange within the case just above the ash-box of the furnace an annular deflector G, as shown in Fig. 1, it being inclined upward and inward toward the fire-pot, with just enough space between its inner edge and the walls of the fire-pot to permit the air to pass. By this arrangement the cold air is first brought into intimate contact with the hot walls of the fire-pot, and from thence it passes upward around the heating-drum.

The hot air may be taken out either at the sides or at the top of the jacket; but where there is sufficient space I prefer to take it out at the top and as near the center as possible, as by that arrangement the air will be drawn over the top of the heating-drum, which will be the hottest part.

It is obvious that good results may be had with this construction of the drums C and D even if the diaphragm *a* be omitted; but I prefer to use it because by so doing the operation is rendered more perfect.

By actual tests I have demonstrated that a furnace constructed on this plan will give far better results than is possible with the ordinary heating-furnaces in general use.

I am aware that furnaces have been constructed with revertible flues for downdraft; but I am not aware that any has been devised like mine, and therefore

What I claim is—

1. In a hot-air furnace, the combination with a fire-pot B provided with the air-inlets *e* and a register for closing the same, of a combustion-chamber C provided at or near its top with an annular row of holes *b*, and a heating-drum D surrounding said combustion-chamber, and having a smoke-pipe opening at the bottom of said drum, all constructed and arranged to operate as and for the purpose set forth.

2. In combination with a fire-pot, the drums C and D constructed and arranged in relation to each other as shown and described, and the diaphragm *a* between said drums and having an opening O at a point opposite that for the smoke-pipe, substantially as shown and described.

In witness whereof I hereunto set my hand in the presence of two witnesses.

ERNEST BETZ.

Witnesses:
HORACE A. DODGE,
W. C. DODGE.