Sept. 21, 1943. N. VAN HOOSE 2,330,094

SOLID-FUEL HEATING DEVICE

Filed March 7, 1941

FIG. 1

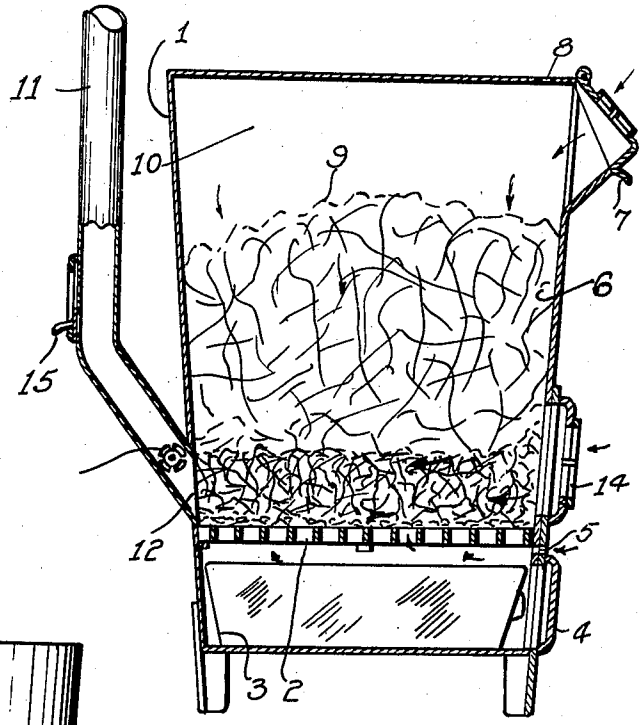
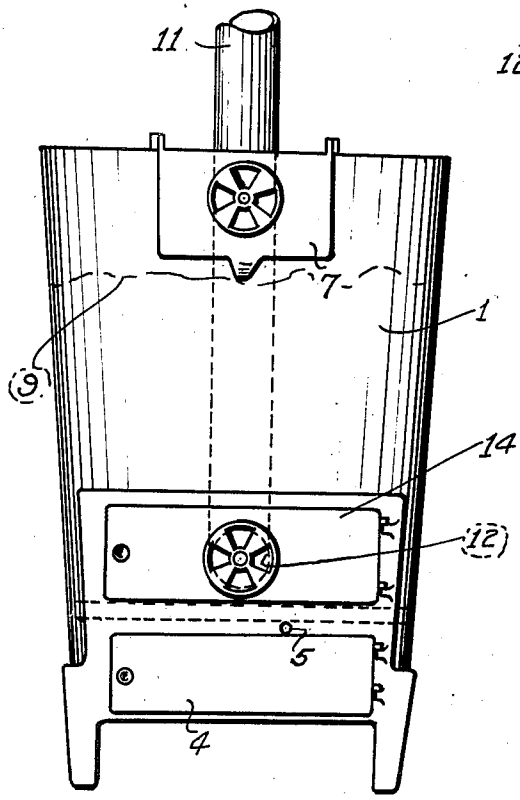


FIG. 2



Inventor
NEAL VAN HOOSE
By: Ben V. Zillman
Attorney

Patented Sept. 21, 1943 2,330,094

UNITED STATES PATENT OFFICE

2,330,094

SOLID-FUEL HEATING DEVICE

Neal Van Hoose, Belleville, Ill., assignor of one-half to Robert J. Harding, East St. Louis, Ill.

Application March 7, 1941, Serial No. 382,113

1 Claim. (Cl. 126—74)

This invention relates to improvements in heating devices, such as stoves, furnaces and the like, used in heating of rooms and similar places, as the need arises, and has as its primary object the burning of relatively high-volatile content solid-fuel, as for example, most of the bituminous coal, and especially of the cheaper grades thereof.

An important object of my invention is to so construct such a heating device, wherein the aforesaid type of solid fuel may be burned in heating the desired rooms or spaces, and without causing an undue amount of smoke and other objectionable emissions from the discharge stack or flue of the heater.

Other objects of the invention are to construct a heating device of the kind described, that will be very simple in construction, low in cost, requiring a minimum of time and attention, which will not burn out its parts rapidly, will obtain a maximum heating value from the solid fuel so consumed, with a minimum of ash or other refuse, and which will be otherwise satisfactory and efficient for use wherever deemed applicable.

Still more objects of the invention are to provide in such a heater, a smoke flue having a single outlet from the combustion chamber of the heater, at a point substantially immediately above the top of the grate, and the entrainment of air from outside the heater through the fuel in the same, in a predetermined manner; there being an admission of such air from below said grate to maintain the latter as cool as possible and prevent the same from burning out, an admission of air from above the fuel so as to travel through the latter for a considerable distance to combine with any of the gases of combustion therein and coke the fuel for substantially the full height of the bed of fuel, and an admission of such air to travel substantially horizontally through the fuel from a point substantially opposite and in the horizontal plane of the flue opening into the heater.

Many other objects and advantages of the construction herein shown and described, will be obvious to those skilled in the art to which this invention appertains, as will be more apparent from the disclosures herein given.

In the drawing, wherein I have illustrated a preferred embodiment of my invention, and in which similar parts are designated by like reference characters throughout the views,

Figure 1 is a vertical sectional view through a simple form of heater unit; and

Figure 2 is a front elevation of the same.

Referring more particularly to the drawing, I have illustrated my invention in substantially its simplest form, but it is to be understood at this point that the principles, functions and purposes herein about to be set forth, may be applied to more complicated and intricate heating devices, and for steam, hot-water and other types of heating systems, as well as the room heater shown.

To this end, there is shown a shell 1 of the required capacity of radiation space and fuel-holding size, this shell being preferably tapered or reduced in inside cross-sectional opening toward its lower end, for a purpose to be hereinafter described.

A grate 2 is positioned transversely across the shell intermediate its top and bottom, and beneath the same there may be removably inserted the usual ash-receptacle 3, the door 4 permitting easy handling of said receptacle and also having adjustment for varying the draft opening. However, it is to be specifically stressed at this point, that there is a small permanent draft opening 5 below the grate, so that at no time can all of the draft be shut off here. In this way it is impossible to permit highly dangerous, explosive mixtures to be built up within the device, as would be caused by a complete sealing here, under certain conditions.

The fuel-receiving or magazine chamber 6 is at the upper side of the grate, of course, and extends upwardly therefrom towards the top of the shell, where there is arranged the charging door 7, also provided with adjustable air-entrainment openings, and there is preferably a permanent draft opening 8 at this point, and for the same purpose and reasons as for the opening 5. The body of fuel 9 does not come clear to the top of the heater, and so there remains the space 10 above the top of the body of fuel.

The flue 11 has but a single opening 12 into the shell wall, preferably substantially immediately above the upper surface of the grate thereat, so that a maximum depth or height of coking may be permitted in the body of fuel above said grate. The portion of the flue that communicates with the interior of the combustion chamber, extends upwardly and outwardly from the latter, as at the fairly sharp angle shown, say about from 35° to 40°, and which arrangement minimizes the accumulation of any sort of sediment, or of coal, in that part of the flue, and permits of easy removal of the same should there be any lodgment thereat. Such a construction of the flue at this point, will increase the ef-

fective life of the same, inasmuch as there will be a minimum of burning of fuel within the flue.

There is arranged, in addition to the two sources of draft above-mentioned, and if so desired, a third source of draft, namely through the door 14 in substantially the same horizontal plane as the flue opening 12 and in alignment therewith, this door too, having means for adjustably varying of the air admitted therethrough.

Thus, there is a draft upwardly through the fuel bed, from beneath the grate, a second draft downwardly through the fuel, from above the fuel bed, and if desired, the third source of draft substantially transversely or horizontally through the fuel bed at substantially the flue opening height. Adjustable openings may be provided in the flue wall adjacent the point where the same enters the shell, in order to be sure to provide oxygen to any combustible gases yet unburned passing through this region.

Enough air may be admitted from above the fuel to carry the volatile, carbonaceous gases downwardly through the fuel bed towards the grate, upon which part there burns the layer of already incandescent fuel, and whereby the resultant waste gases may be withdrawn through the flue. However, the main source of draft is furnished from below the grate, the outside air arising through the latter to keep the under side of the grate relatively cool, thence passing on through the burning fuel and out the flue. The incandescent level is therefore far below the top of the fuel in the combustion chamber; it is at substantially the height of the flue opening 12.

The air admitted through the intermediate door at the front of the heater tends to spread or widen the incandescent area horizontally from adjacent the center and rear of the heater, bringing this incandescent layer towards the front of the latter. There need not be any permanent vent adjacent said intermediate door, as the previously mentioned positioning of permanent openings, and most especially the one below the grate, will take care of preventing any explosions resulting from too great an accumulation of gases within the heater. The check draft 15 may be placed on the flue sufficiently close to the lead-in to the heater shell, and wherein it may serve as a clean-out to insure complete dislodgment of any sediment in the flue at this region.

As previously mentioned, the heater shell is preferably reduced in internal diameter toward the grate, somewhat as shown, so that as the fuel becomes coked above the flue outlet, the coal will automatically lower itself to continue to substantially fill the width of the combustion chamber, to insure that the air and other gases passing downwardly will travel through the entire mass of fuel above the grate, and not travel merely around the rim.

Thus, there will be a most efficient admixture of the gases reaching the incandescent areas, to completely burn the same with minimum loss of its heat units, and permitting the burning of substantially the lowest grades of bituminous fuel, even in those localities having stringent smoke laws.

Having thus described my invention, it is obvious that various immaterial changes may be made in the same without departing from the spirit of my invention; hence I do not wish to be understood as limiting myself to the exact form, arrangement, construction, and combination of parts herein shown and described, except as limited by the state of the art to which the invention appertains, and the claim hereunto appended.

What I claim as new and desire to secure by Letters Patent is:

In a heater using solid fuel for heating a room, a single shell having a grate substantially entirely thereacross to receive a body of fuel, a flue leading from said shell wall from immediately above said grate and extending directly into the room to be heated, an ash chamber below said grate, a bottom opening in said shell in substantially horizontal alignment with said flue for admitting air from exteriorly of said shell to pass upwardly through said grate, a top opening in said shell for admitting outside air to pass downwardly through said body of fuel, and an intermediate opening for admitting air from without said shell substantially in horizontal alignment with the flue outlet to pass horizontally through said body of fuel.

NEAL VAN HOOSE.