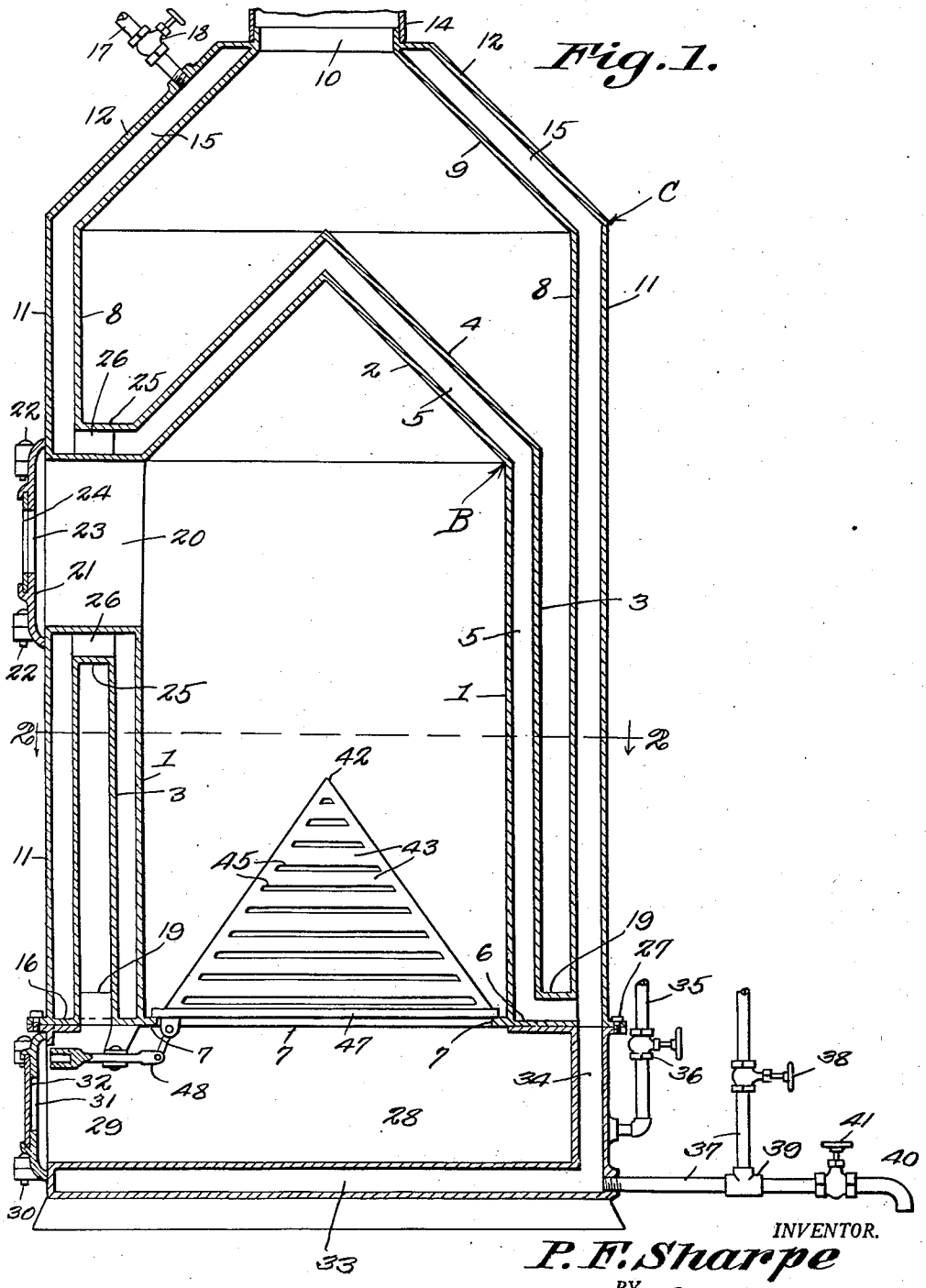
May 1, 1945. P. F. SHARPE 2,374,707

FURNACE

Filed July 16, 1943 2 Sheets-Sheet 1

Fig. 1.



INVENTOR.

P. F. Sharpe

BY

Albert G. Davis & Co.

ATTORNEYS.

May 1, 1945. P. F. SHARPE 2,374,707

FURNACE

Filed July 16, 1943 2 Sheets-Sheet 2

Fig. 2.

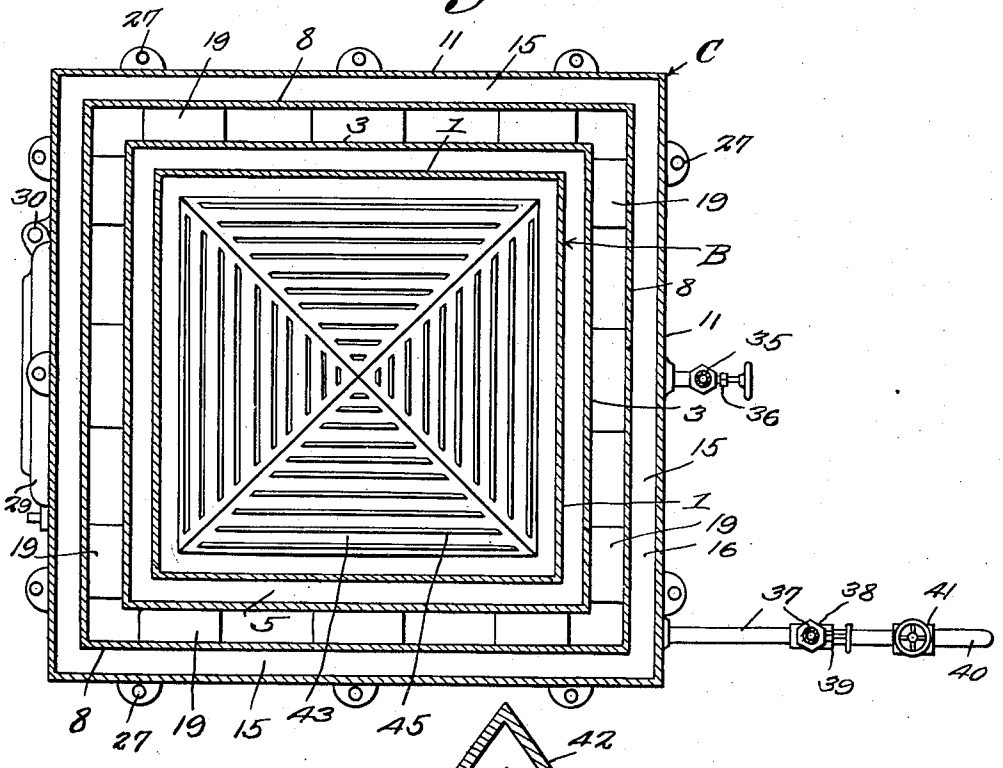
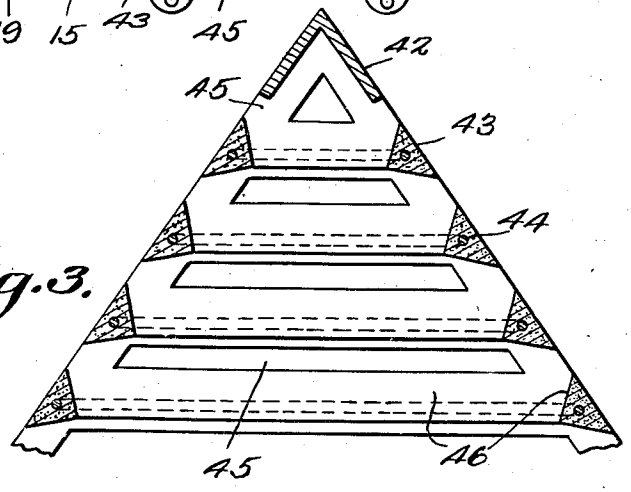


Fig. 3.



P. F. Sharpe

INVENTOR.

BY Albert G. Davis & Co.

ATTORNEYS.

Patented May 1, 1945

2,374,707

UNITED STATES PATENT OFFICE

2,374,707

FURNACE

Peter F. Sharpe, Atlantic City, N. J.

Application July 16, 1943, Serial No. 494,986

1 Claim. (Cl. 122—160)

This invention aims to provide a furnace, intended primarily although not exclusively for domestic use, so constructed that air and products of combustion will travel downwardly through the coal or other fuel, the result being that the gases are thoroughly consumed, it being a matter of common knowledge that the loss of heat units in an up-draft furnace is considerable.

Another object of the invention is to provide a novel system of water jacketing, which will serve not only to keep the furnace structure reasonably cool, but will result, also, in an ample supply of hot water, at all times, for heating purposes in radiators or other fixtures.

A further object of the invention is to avoid the collection of dust from flues and the like, the loss of heat through the accumulation of dust being marked, in a furnace of ordinary construction.

A further object of the invention is to provide a furnace which may be built of rectangular horizontal cross section, if desired, a saving of space resulting.

A further object of the invention is to construct a grate of novel make-up, the grate being in the form of a cone or pyramid, the weight of the coal forcing the ashes downwardly through the grate, a shaking or racking of the grate being unnecessary.

It is within the province of the disclosure to improve generally and to enhance the utility of devices of that type to which the present invention appertains.

With the above and other objects in view, which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed, may be made within the scope of what is claimed, without departing from the spirit of the invention.

In the accompanying drawings:

Fig. 1 shows in vertical section, a furnace constructed in accordance with the invention, parts remaining in elevation;

Fig. 2 is a cross section taken approximately on the line 2—2 of Fig. 1;

Fig. 3 is a vertical section through the grate, parts being broken away.

The furnace forming the subject matter of this application is shown as being of rectangular cross section, although, as hereinbefore intimated, it may be of any other cross section.

The furnace comprises a body B including an inner wall 1, merging into an upwardly tapered top 2. The body B includes an outer wall 3, merging into an upwardly tapered top 4. The inner wall 1 is separated from the outer wall 3, and the top 2 is separated from the top 4, to define a water space 5. A member 6 connects the walls 1 and 3, and forms a closure for the lower end of the water space 5. The member 6 is extended inwardly, to form a flange 7, the function of which will be made manifest hereinafter.

The letter C designates a casing surrounding the body B, the casing including an inner wall 8, merging into an upwardly tapered top 9 carrying a neck 10. The casing C includes an outer wall 11 merging into an upwardly tapered wall 12. The inner wall 8 is separated from the outer wall 11, and the top 9 is separated from the top 12, to define a water space 15. A member 16 connects the walls 8 and 11, and forms a closure for the lower end of the water space 15. The top 12 is supplied with a chimney 14, surrounding the neck 10 of the top 9 closely.

A pipe 17 is connected with the top 12 and communicates with the water space 15. The pipe 17 leads to a radiator or other instrumentality (not shown), in which hot water is needed. A valve 18, under the control of an operator, is interposed in the pipe 17.

Conduits 19 are mounted in the lower part of the inner wall 8 of the casing C and in the lower part of the outer wall 3 of the body B, and establish communication between the water space 15 and the water space 5. The conduits 19 also serve as mechanical connections between the casing C and the body B.

The inner wall 1 of the body B and the outer wall 11 of the casing C carry a lateral, tubular, air and fuel inlet 20, located at the place of juncture between the wall 1 and the top 2, the inlet opening through the walls 1, 3, 8 and 11. A stoke door 21 is hinged at 22 to the wall 11, at the outer end of the member 20, and has an air admission opening 23 controlled by a movable damper 24 on the door. Fuel is introduced into the combustion chamber of the body B, through the member 20, the door 21 being opened.

A ring 25 is fixed at its outer end to the wall 8, and at its inner end to the wall 3 and to the top 4, and is disposed about the inlet tube 20. The ring 25 affords a water space 26 surrounding the inlet tube 20. The tube 20 thus is provided with a water jacket, as is the body B and as is, also, the casing C. The water jacket 26

for the inlet member 20 communicates at its outer end with the water space 15, and at its inner end with the water space 5.

The casing rests upon an ash pit 28, to which the casing is secured as shown at 27. A cleanout door 29 is hinged at 30 to the ash pit 28. The door 29 has an opening 31, for inspection, or any other useful purpose, but the door opening is normally closed by a slide 32 mounted on the door, it being intended that there shall be no updraft through the opening 31.

There is a water space 33 in the bottom of the ash pit 28, the water space preferably being coextensive in area with the bottom of the ash pit. The water space 33 communicates with the lower end of a water space 34 surrounding the ash pit 28 saving at the place where the opening that is closed by the door 29 is located. The upper end of the water space 34 communicates with the water space 15.

A pipe 35 is carried by the ash pit 28 and communicates with the water space 34 of the ash pit, a valve 36, under the control of an operator, being interposed in the pipe 35. The pipe 35 may be considered as part of the pipe 17 of Fig. 1, in which the radiator or the like (not shown) is located, the pipe 35 thus constituting a return pipe for the radiator or its equivalent.

An L-shaped pipe 37 is provided and includes a horizontal branch and a vertical branch. The horizontal branch of the pipe 37 is connected to the outer wall of the ash pit 28 and communicates with the water spaces 34 and 33. The water moves upwardly through the water space 34. A hand valve 38, or any other suitable form of valve actuated by an operator, is interposed in the vertical branch of the pipe 37. A coupling 39 which joins the branches of the pipe 37 is connected to a nozzle 40, to facilitate the drawing off of water from the furnace, a valve 41, under the control of an operator, constituting part of the nozzle 40.

In the combustion chamber of the furnace is located a grate 42 of upwardly tapered construction, and in the present instance of pyramidal construction, the grate being closed at its apex. The grate 42 comprises horizontal bars 43 in which are located reinforcements 44. The spaces between the grate bars 43 form substantially horizontal slots 45 in the grate, the slots opening downwardly. The grate bars 43 preferably are of triangular cross section, and have inwardly and downwardly sloping surfaces 46.

Coal or other fuel is placed in the combustion chamber at a height somewhat above the apex of the grate 42. The ashes tend to drop downwardly through the slots 45, and the inwardly and downwardly inclined surfaces 46 of the grate bars 43 tend to direct the ashes inwardly and downwardly into the ash pit 28. The grate 42 is provided at its lower end with an outstanding rim 47 resting on the flange 7 of the furnace body B.

Ordinarily, there is no occasion for shaking the grate 42, but if desired, any suitable mechanism 48 for that purpose, located within the ash pit 28, and accessible when the door 29 is opened, may be provided. The weight of coal or other fuel on the ashes, tends to force the ashes downwardly through the slots 45 of the grate 42, and aside from emergency use, the mechanism 48 may be disregarded.

Assuming that the valves 38 and 41 are closed, and that the valve 36 is opened, the water-flow or circulation takes place through the following parts:

The pipe 17 (the valve 18 being opened), the radiator or the like (not shown), the pipe 35, the water space 34, the water space 15, the conduits 19, the water space 5 and the water space 26. Thus, the body B, the casing C and the inlet member 20 are adequately water jacketed. As the water in the space 33 becomes heated, the water rises through the space 34, to be replaced by cooler water derived from the pipe 35.

Air enters the opening 23 in the door 21, under the governance of the damper 24, and moves inwardly into the central combustion chamber, by way of the inlet member 20. The air is mingled with the products of combustion and moves downwardly into the inside of the grate 42, by way of the slots 45. The gaseous mixture passes through the ash pit 28, and, passing between the conduits 19, moves upwardly between the walls 3 and 8 of the body B and the casing C, respectively, into the space between the top 4 and the top 9, exit being afforded by the neck 10 and the chimney 14.

It will be noted that the water return 35 communicates with the side wall water space 34 of the ash pit, at a place below the grate 42, the water supply 37 communicating with the water spaces of the ash pit at a place below the grate. The products of combustion which pass downwardly through the grate 42 will be applied to the water space 34 while they are at a high temperature and before they ascend through the updraft space between the casing and the body. The circumferentially spaced conduits 19 are of such area as to form effective baffles, which tend to hold back the products of combustion in the ash pit and facilitate the heating of the water spaces of the ash pit.

What is claimed is:

A water heater comprising an ash pit, a furnace supported on the ash pit and including a casing having an upper outlet for the products of combustion, a body within the casing, means for admitting air and fuel to the body, the body and the casing being separated to form an updraft space communicating at its upper end with the outlet and at its lower end with the ash pit, a grate in the lower portion of the body and open to permit air and products of combustion to pass downwardly through the grate and into the ash pit, the body and the casing being provided with surrounding water spaces, the ash pit having a water space in its bottom and having an upright, side-wall-water-space communicating at its lower end with the bottom water space of the ash pit, and at its upper end with the lower end of the water space of the casing, an upper outlet for the water space of the casing, a water return communicating with the side-wall-water-space, at a place below the grate and a water supply communicating with one of the water spaces of the ash pit at a place below the grate whereby the products of combustion passing downwardly through the grate will be applied to the side-wall-water-space while they are at a high temperature and before they ascend through the updraft space, and a plurality of circumferentially-spaced conduits connecting the lower ends of the water spaces of the casing and of the body, and of such area as to form effective baffles, which tend to hold back the products of combustion in the ash pit and facilitate the heating of the water spaces of the ash pit.

PETER F. SHARPE.