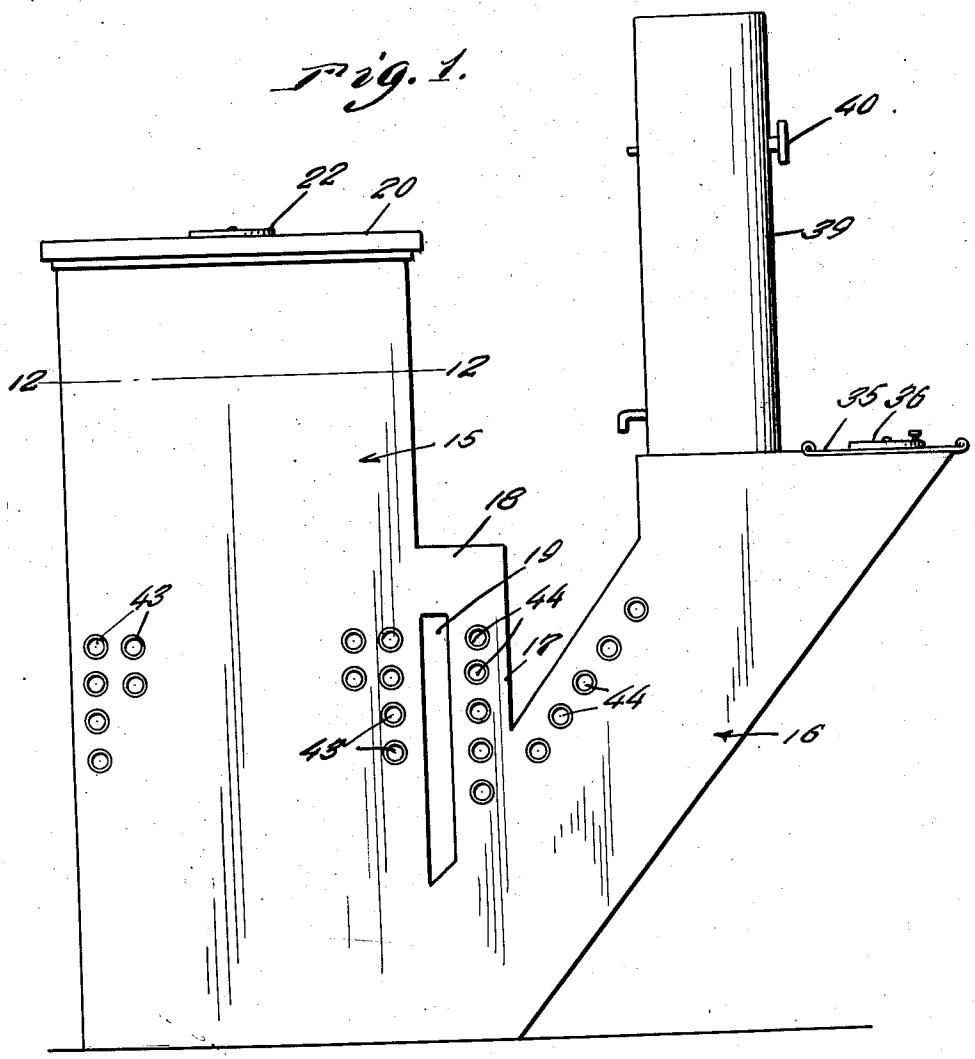
Feb. 26, 1935. F. S. BRADLEY 1,992,468

TANK HEATER

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Fig. 1.



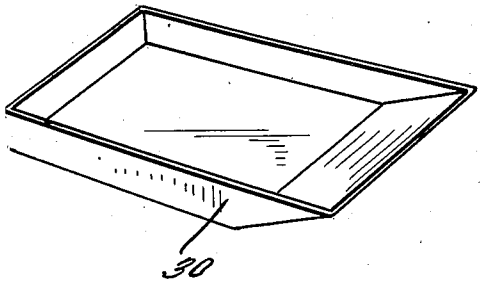


Fig. 9.

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Fig. 2.

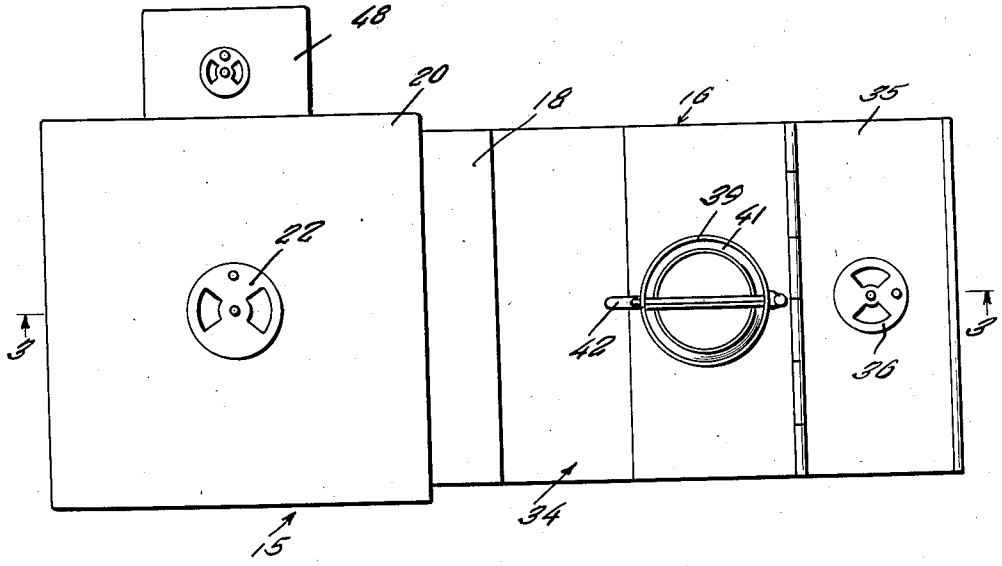
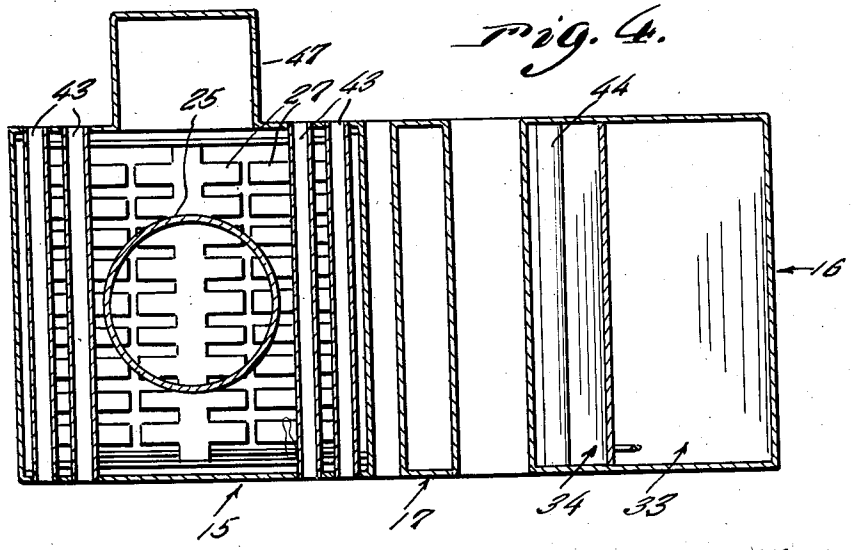


Fig. 4.



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Fig. 3.

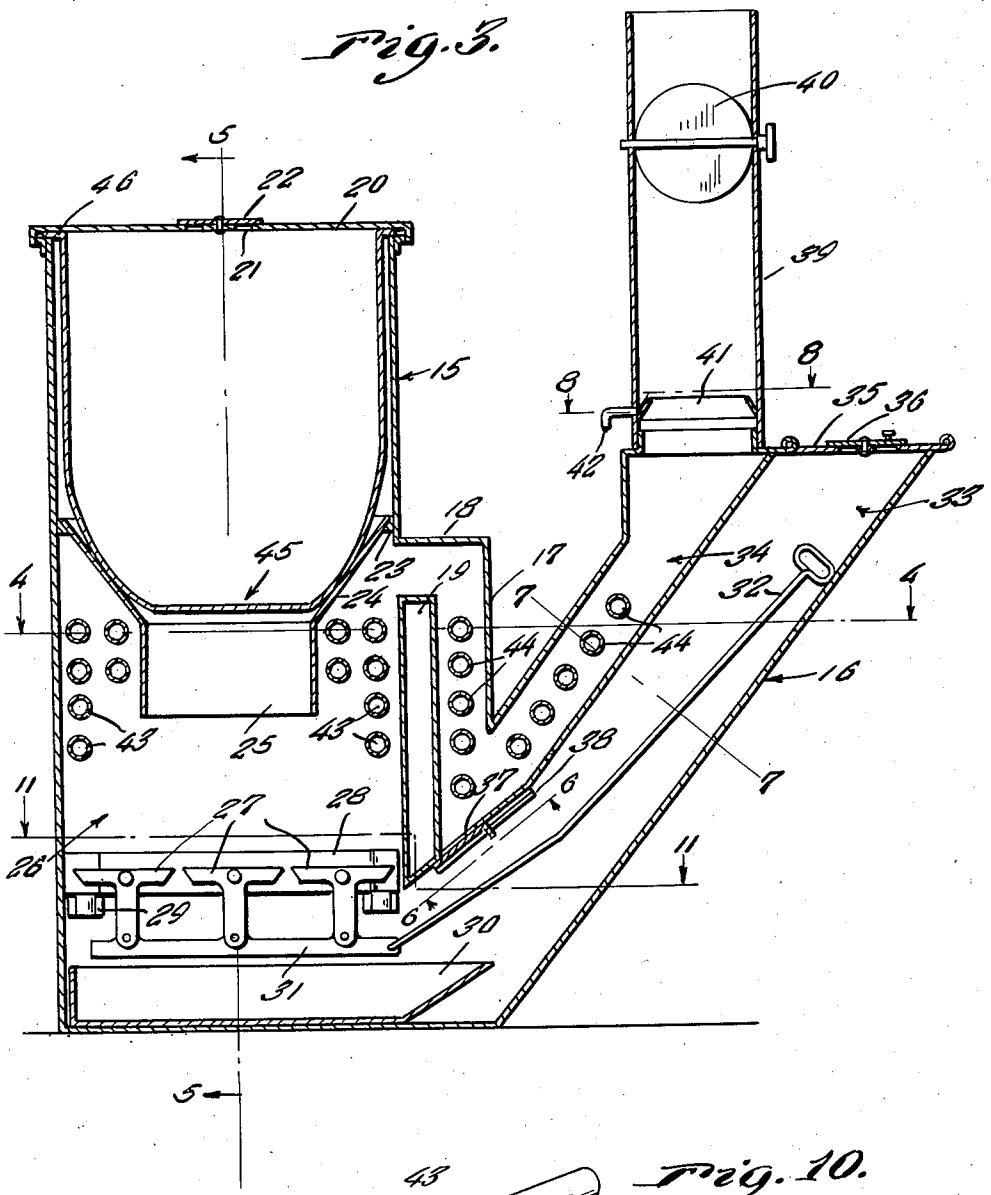
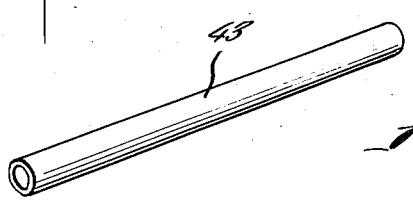


Fig. 10.



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Fig. 5.

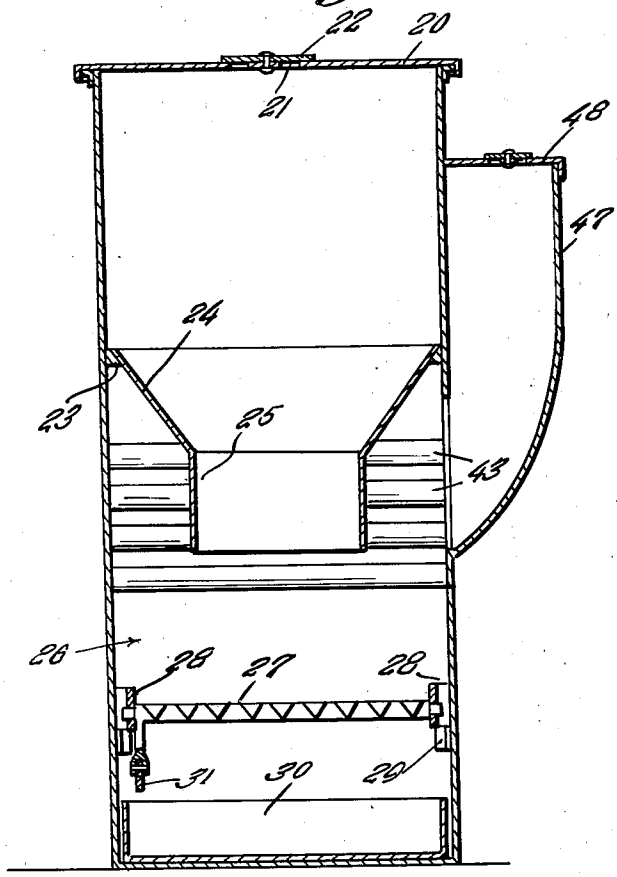


Fig. 6.

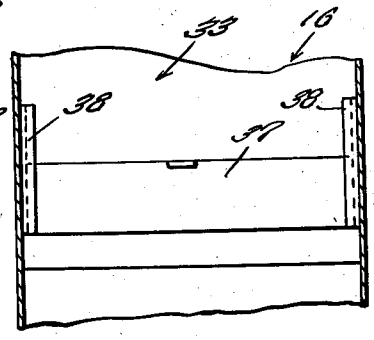
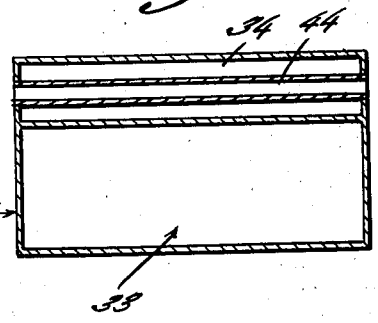


Fig. 7.



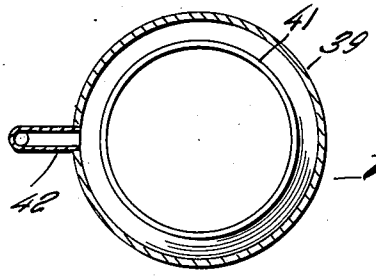


Fig. 8.

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TANK HEATER

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Fig. 11.

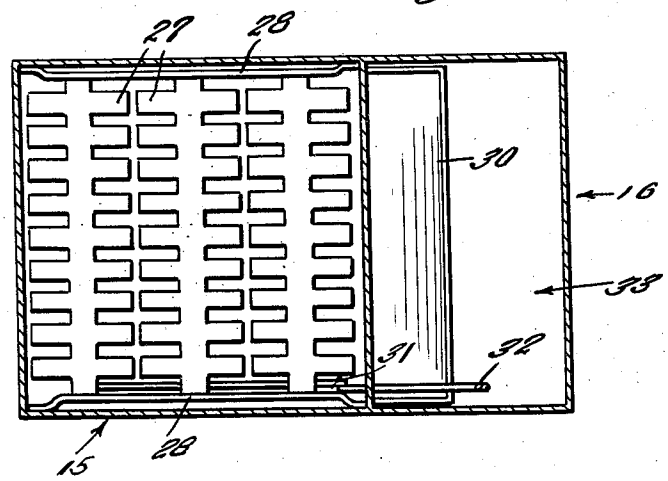
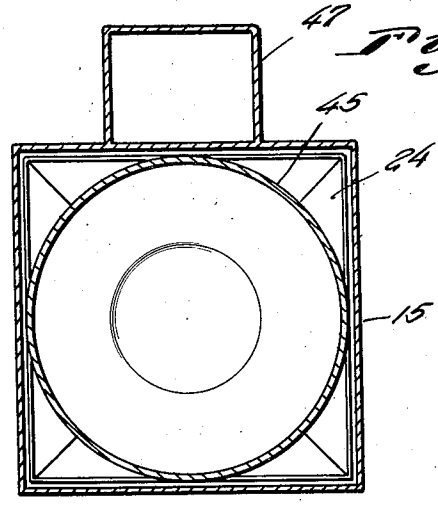


Fig. 12.



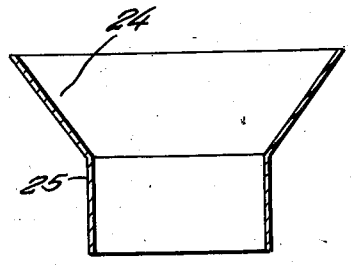


Fig. 13.

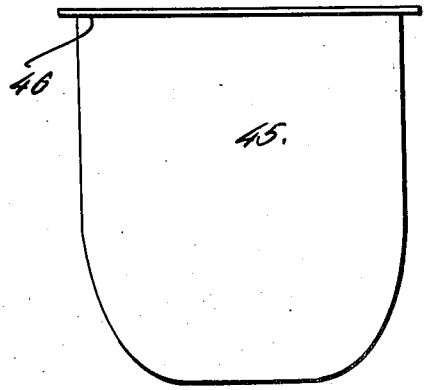


Fig. 14.

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UNITED STATES PATENT OFFICE

1,992,468

TANK HEATER

Floyd S. Bradley, Lambert, Mont.

Application March 2, 1934, Serial No. 713,739

2 Claims. (Cl. 126—367)

This invention relates to the broad class of heating apparatus and has more particular reference to a device such as is referred to hereinafter as a tank heater, wherein said device, as the name implies, is submerged in water in a tank or receptacle in a manner to heat the water and utilize the heat generated thereby for heating and cooking purposes.

In reducing the invention to practice I have evolved and produced a structure possessing noteworthy features of refinement and structural improvement carefully selected and coordinated to promote efficiency and to permit the accomplishment of the desired result in a highly dependable and satisfactory manner.

In perfecting the principles of the present inventive idea my primary aim is to utilize a heater employing economical fuel such as coal and wood and to embody in said heater a multiplicity of open ended water tubes which when submerged in the water in the tank surrounding the heater provide the desired circulation for effective and positive heating results.

As I visualize the improved structure in contrast known heaters of a similar type I find several structural distinctions which, it is believed, transcend similar adaptations in that they are more satisfactorily adapted and fitted for the intended purposes.

One feature is predicated upon the adoption and use of a removable multiple grate unit on which the fire is built with an ash pan located therebeneath together with shaking means for the grate located in an elevated branch forming an integral part of the casing structure and serving as a chute for removing the ash pan, as a means of access to the shaker device as well as a down draft for developing requisite circulation of air for efficient combustion purposes.

Another feature is based on the adoption and use of a multiplicity of horizontal water tubes built into the casing structure and all located below the normal water level line, some of the water tubes being located directly above the fire in the firepot for direct heating means and others located in a predetermined portion of the smoke flue so as to effectively utilize the exhausting particles of heat and heat waves for efficient heat generation purposes.

A further feature of the construction, as will be hereinafter discerned, is found in the adoption and use of a vertically elongated body constituting the major part of the casing structure which body defines the ashpit, firepot and heater and which is so fashioned as to accommodate a removable food containing vessel such as a pot or kettle employed for cooking food.

Other and more specific structural features and improvements will become more readily apparent from the following description and drawings.

In the drawings:

Figure 1 is a side elevational view of the complete assembly disclosing the shape of the component parts and their relative structural relationship.

Figure 2 is a top plan view of Figure 1.

Figure 3 is a central vertical sectional view with parts in elevation, taken approximately on the plane of the line 3—3 of Figure 2.

Figure 4 is a horizontal sectional view taken on the plane of the line 4—4 of Figure 3.

Figure 5 is a vertical section at right angles to Figure 4, the sections being on the plane of the line 5—5 of Figure 3.

Figure 6 is a detail section of a soot discharge slide located in the smoke flue, the section being on the plane of the line 6—6 of Figure 3.

Figures 7 and 8 are detail sections on the lines 7—7 and 8—8 respectively of Figure 3.

Figure 9 is a perspective view of the ash pan.

Figure 10 is a perspective view of one of the pipes forming a water circulating tube.

Figure 11 is a horizontal sectional view on the plane of the line 11—11 of Figure 3.

Figure 12 is a horizontal section on the line 12—12 of Figure 1.

Figure 13 is a sectional view of the removable hopper.

Figure 14 is a detail elevational view of the removable feed pot or kettle.

Referring first to Figure 1 which shows the casing structure and its parts in elevation it will be observed that it is in the form of a sheet metal casing which includes a vertically elongated body 15 which may be described as the heater proper. As shown in Figure 12 this is substantially rectangular in cross sectional shape. Then as shown in Figure 1 it will be observed that the numeral 16 designates a laterally and upwardly directed hollow branch which is an integral part of the casing structure and which is disposed at an approximate acute angle to the heater 15 rising to a point above the normal water level line, that is the water level of the tank or other vessel (not shown) in which the device is submerged in a well known manner. Between the body or heater 15 and the branch 16 it is substantially L-shaped intermediate or subordinate branch 17 which constitutes a part of the smoke flue and which is joined as at 18 to the heater at a point

above the uppermost tubes. It will be further noted in Figure 1 that the structure is so fashioned at this point as to define a vertically elongated slot 19 which functions as a water passage.

Referring now to Figure 3 I call attention to the numerals 20 which designate a removable cover having steam discharge passages 21 and a closing valve or disk 22 for regulation purposes. On the interior below this cover is a supporting ledge 23 fashioned to support the tapered portion 24 of a hopper. It will be observed that the hopper is formed with a depending neck 25 to discharge the coal or other fuel conveniently into the firebox or chamber.

This firebox is differentiated by the numeral 26 and in reality is merely the area above the grate structure. This grate structure comprises a plurality of rockably mounted fuel supporting grates 27 carried by hanger straps 28 removably supported on appropriate supporting elements 29 on the interior of the heater. The grate structure or assembly is supported in elevated position above the bottom of the heater so as to define an ashpit. In this ashpit is located a removable ash pan or tray 30. It will also be observed in Figure 3 that the grates are made for connection with a shaker link 31 actuated by a detachable elongated remote control handle 32. In connection with this handle I would point out that there is a partition on the interior of the branch 16 which divides it into an adapter chute 33 and a smoke flue 34. The smoke flue has communication with the heater by way of the aforementioned branch 17 at its intake 18. In fact these two features 17 and 34 define a sort of a V-shaped smoke flue.

I use the term "chute" to define the passage 33 since this permits the ash pan to be grasped by a suitable instrument, such as tongs (not shown) and drawn upwardly through the chute for dumping purposes. This permits removal of ashes without lifting the heater from the water tank. The upper end of the chute is covered by a lid 35 having a suitable adjustable valve or damper 36. This lid is normally closed and the damper can be adjusted as conditions require so as to permit the same chute 33 to serve as a down draft for feeding air to the fire. This passage 33 also functions as a convenient means for inspecting the condition of the fire whenever necessary or desired. Its principal purpose however is to permit the handle 32 to be inserted and connected with the link 31 for the purpose of shaking the grates to keep the fire in good condition and yet permitting this to be accomplished by simply opening the lid 35 without making it necessary to lift or remove the device from the body of water in which it is submerged. It will be noticed as an incidental feature that the part constituting the juncture between the passages 17 and 34 is formed with a soot opening or hole which is closed by a slide plate 37. This is mounted in suitable guides 38 and it is constructed to permit a suitable tool to be inserted down through the chute 33 and engaged with the slide for opening it to allow the soot to be dropped down into the ash pan. This is for cleaning the smoke flue conveniently.

I next call attention to the numeral 39 which designates a pipe or sack having a damper 40. This is attached to the upper end of the smoke flue. On the interior is a gutter 41 which serves as a condensation trap. The smoke in escaping carries a certain amount of moisture and this moisture collected in the trap and is discharged through a drain pipe 42. This decidedly increases the efficiency of operation of the device as a whole.

I next call attention to the tube arrangement. The main tubes are designated by the numerals 43 and are located in the firebox. Any suitable number of tubes may be employed. They are preferably arranged in superposed relation and open through opposed walls of the heater 15. Then there are supplemental water tubes 44 located in appropriate order and spaced relation in the V-shaped smoke discharge passage or flue made up of the features 17 and 34. This permits the utilization of the escaping heat particles and smoke to more effectively heat the water through the instrumentality of the supplemental water tubes 44. In other words the main tubes 43 are heated by direct heat from the firebox and the water tubes 44 by the escaping heat waves carried by the smoke and combustion. The uppermost tubes of both sets are located in an approximate novel plane which is below the normal water level line in the tank (not shown). Incidentally the water in the tank is circulated back and forth through the water tubes in an obvious way when it becomes heated. The water is of course heated by the fire in the firebox as is evident.

As before stated the device may be employed as a heater for buildings or other enclosures or it may be utilized as a cooker. When utilized as a cooker I have found it practical and expedient to employ a feed pot or kettle 45 of the type shown in Figure 14. This pot is provided with a supporting flange 46 which rests on the top of the heater. It is covered by the lid or cover plate 20 and the steam is allowed to escape through the openings 21 by way of the valve disk 22.

As a general proposition the coal or fuel magazine (not shown) is placed over the heater first during which time the pot 45 is of course removed and the main bulk of fuel is placed in the fire box 26. During this fuel placement period the hopper 24 serves to feed the coal uniformly.

The pot, which is an optional feature, is removable, the hopper is removable, the grate structure is removable, and the ash pan is removable.

As an added feature I provide on one side of the heater a side fuel feeder which is nothing more than a container 47 of the type shown in Figure 5 this being provided with a valved cover 48. Thus when the device is used for cooking purposes this side feeder is filled with coal and the coal is automatically gravitated into the firebox. In a sense the side feeder is an automatic stoker.

I desire to emphasize the portability of the device as a unit as well as the fact that it serves not only as a heater for heat radiation and room warming purposes but as a convenient cooker for feeds. Secondly I call attention to the removability of the pot or kettle 45 as well as the removability to the top of the heater 15 of the hopper and grate structure. When the grate structure is removed the handle 32, which is of an extension and detachable type, is of course disconnected.

In conclusion I desire to point out that the grate structure can of course be removed through the top of the heater by removing the hopper and cover. This necessitates tilting or angling of the grate structure so that it can be passed between the flues 43. It is also possible to disconnect the grate structure from its supporting

means at the bottom of the firebox and to drop it down into the ashpit and remove it by way of the chute 33. Although it is possible to leave the hopper 24 in place even when the feed pot is put in position it is generally desirable to remove the hopper first and then put the pot in position so that it will receive a more distributed supply of heat from the firebox. The water tank is of course proportioned with respect to the heater as to allow the top of the heater and the corresponding portions of the chute to stand above the normal water level in the tank.

Minor changes in shape, size, and rearrangement of details coming within the field of invention claimed may be resorted to in actual practice, if desired.

Having thus described my invention, what I claim as new is:

1. A device of the class described comprising a casing structure including a vertically elongated portion defining the heater proper, a plurality of water tubes located in the lower portion of said heater, a grate assembly supported below said water tubes and above the bottom of the heater, said grate assembly including a plurality of complemental oscillatory grates connected together by a single operating link, an ash pan supported in the pit portion of the heater below said grate assembly, said casing structure including a lateral upstanding branch communicating at said lower end with said pit, said branch including a chute for removing the ash pan, said branch extending to a point above the normal water line and serving not only as a down draft but as a means permitting the use of an extension handle therein for actuating said link, said branch being partitioned so that the upper portion thereof defines a smoke discharge flue, the lower end of said smoke flue being connected with an upstanding supplemental intake branches joined to the heater at a point above the water tubes, and a plurality of additional water tubes mounted in the passage defining said smoke flue.

2. In a device of the class described comprising a casing structure including a vertically elongated portion defining the heater proper, a plurality of water tubes located in the lower portion of the heater, a grate assembly supported below said water tubes and above the bottom of the heater, an ash pan supported in the pit portion of the heater below the grate, a lateral upstanding branch, said casing structure including said lateral upstanding branch communicating at its lower end with the pit, said branch being partitioned whereby the upper portion thereof defines a smoke discharge flue, and means extending upwardly from the grate in the lower portion of the branch for manually shaking the grate.

FLOYD S. BRADLEY.