Feb. 27, 1945. G. ANDERSON 2,370,116

HEATER

Filed Dec. 26, 1942 3 Sheets-Sheet 1

Fig. 1

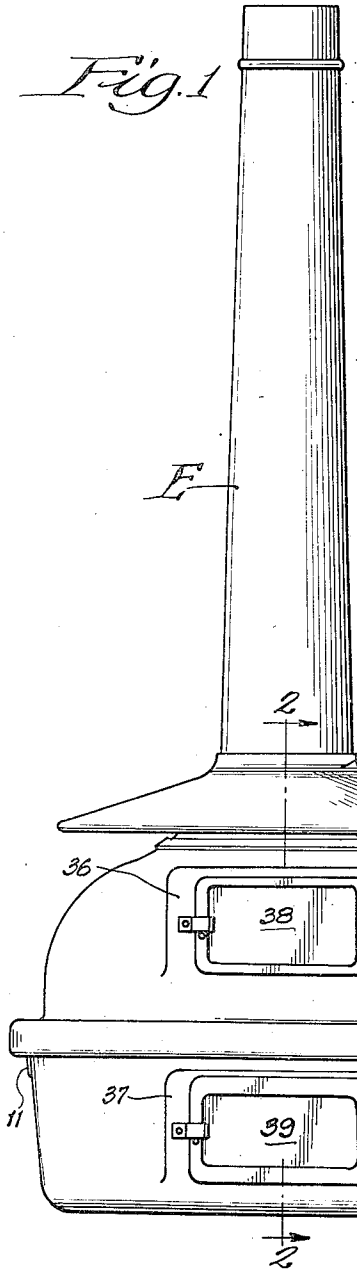


Fig. 3

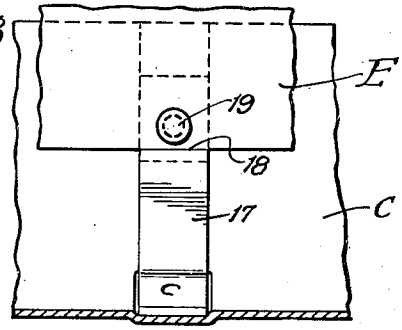


Fig. 4

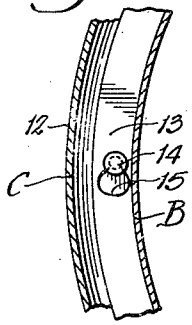
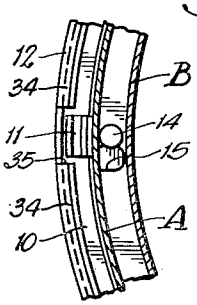
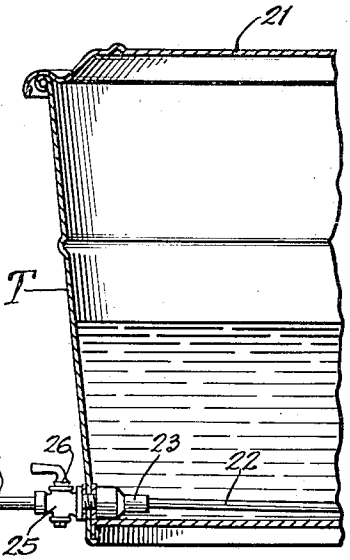


Fig. 5





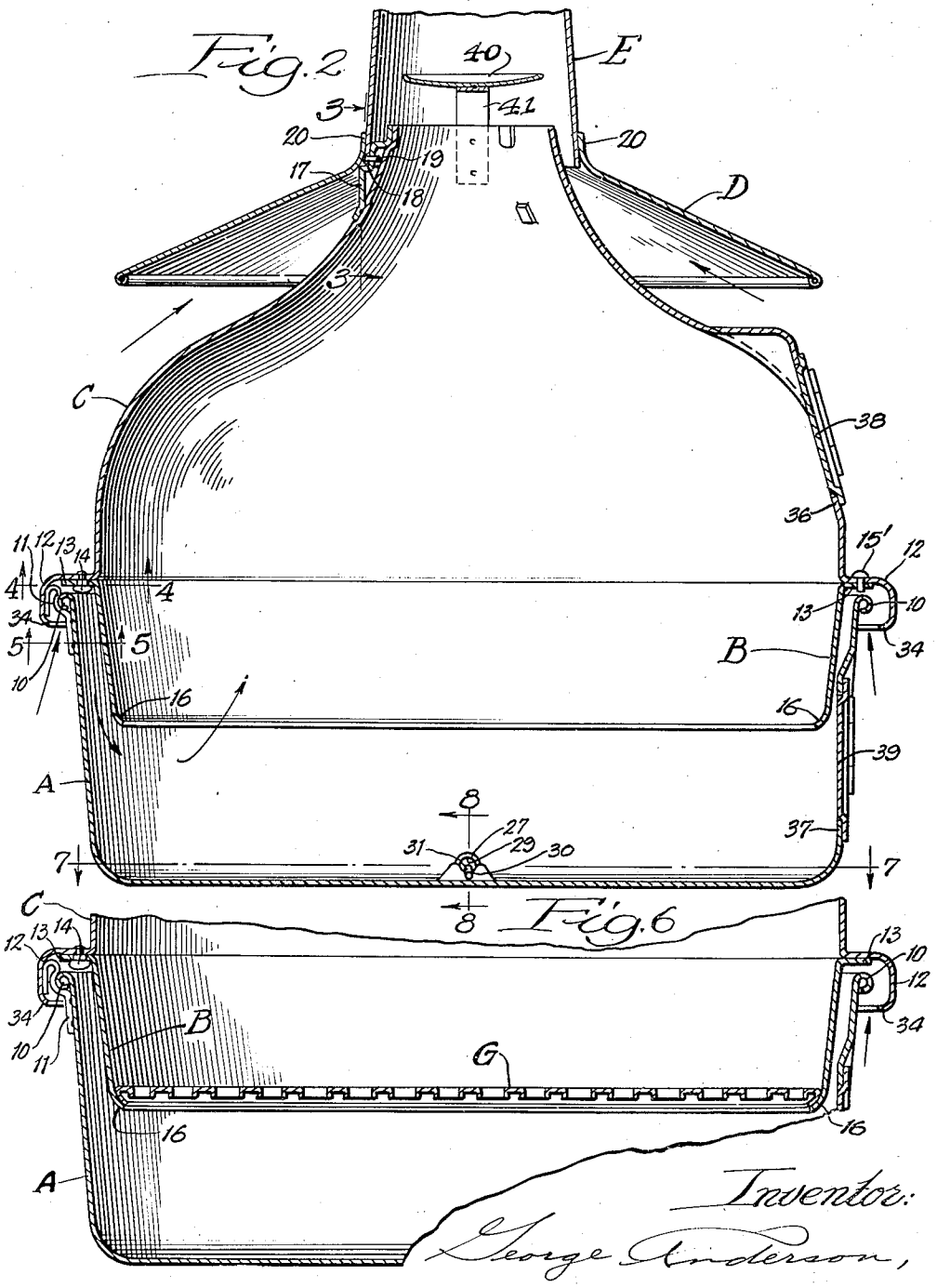
Inventor:
George Anderson,
By Soans, Ford & Anderson,
Attorneys.

Feb. 27, 1945. G. ANDERSON 2,370,116

HEATER

Filed Dec. 26, 1942 3 Sheets-Sheet 2

Fig. 2



Inventor:
George Anderson,

By Evans, Pond & Anderson,
Attorneys.

Feb. 27, 1945. G. ANDERSON 2,370,116

HEATER

Filed Dec. 26, 1942 3 Sheets-Sheet 3

Fig. 7

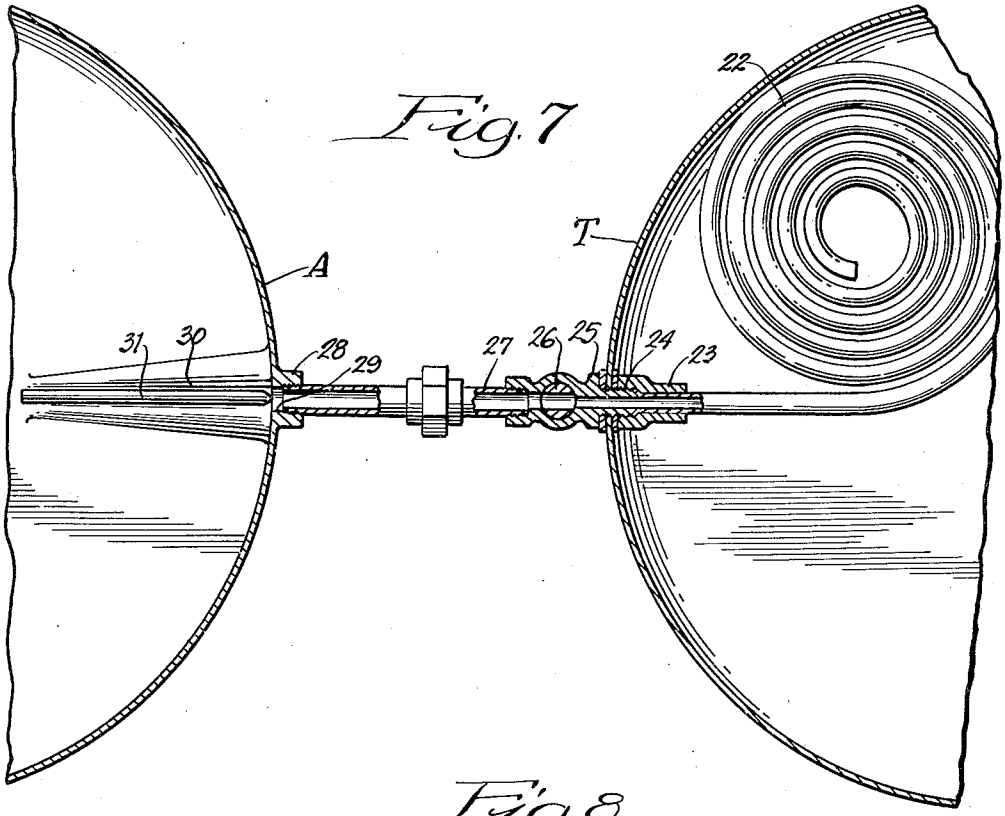


Fig. 8

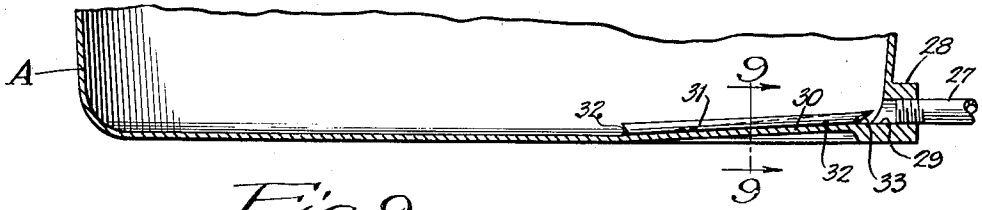


Fig. 9

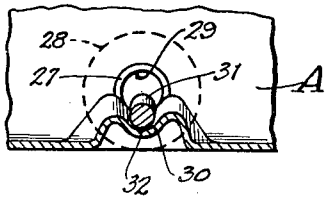
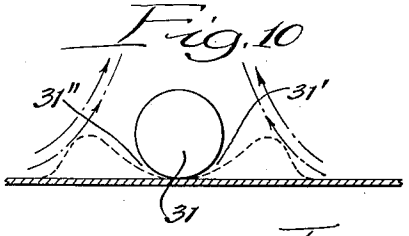


Fig. 10



Inventor:
George Anderson,
By Evans, Ford & Anderson,
Attorneys.

Patented Feb. 27, 1945

2,370,116

UNITED STATES PATENT OFFICE

2,370,116

HEATER

George Anderson, Chicago, Ill.

Application December 26, 1942, Serial No. 470,155

8 Claims. (Cl. 158—91)

The subject of this invention is a heater, that has been designed more particularly as an orchard heater, but is also well adapted to serve the purposes of a camp stove, or, by extending the smoke stack through the roof, as a cabin heater, and in other situations where a small, compact, and easily assembled and disassembled air heating device is useful.

Among the objects of the invention I may mention the following:

To provide a heater of very simple construction and low cost; to provide a heater composed of separable parts, not requiring the use of screws or bolts, that can be assembled for service and taken down in a few minutes; to provide a heater that will cut fuel costs fully one-half with no diminution of efficiency as compared with known heaters of its class; to provide a heater that will burn oil or a solid fuel such as coal, coke or wood with equal efficiency, and, when burning oil, will require no night refilling and no stack cleaning, but will be self-cleaning of soot and like carbon deposits; to provide a heater that will burn oil at a steady and uniform rate, practically unaffected by wind conditions; and to provide a heater that, in operation, will deliver a very intense and constant heat through utilization of all three principles of conduction, convection and radiation.

Still further objects and attendant advantages of the invention will be apparent to those skilled in the art of heaters in general and orchard heaters in particular from the following detailed description of a preferred embodiment thereof illustrated in the accompanying drawings, wherein—

Fig. 1 is a front elevation of the assembled heater, showing also, in vertical section, a fragment of an oil tank which supplies oil to the bottom of the heater proper;

Fig. 2 is an enlarged vertical axial section, taken on the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary vertical section, taken on the line 3—3 of Fig. 2;

Figs. 4 and 5 are fragmentary horizontal sections taken on the lines 4—4 and 5—5 respectively of Fig. 2, viewed from beneath;

Fig. 6 is a modification of the lower portion of Fig. 2, showing the addition of a grate for burning solid fuel;

Fig. 7 is a horizontal section on the line 7—7 of Fig. 2, through adjacent portions of the heater and the fuel tank, and showing the fuel pipe connection and its valve for opening and cutting off the fuel supply to the heater;

Fig. 8 is a vertical diametric section through the bottom of the fuel burner pan of the heater, taken on the line 8—8 of Fig. 2, and cutting lengthwise of the bottom of a channel that seats a metal pilot rod, said channel and pilot rod conducting the oil to approximately the center of the burner pan where the inflowing oil bursts into flames;

Fig. 9 is an enlarged vertical section taken on the line 9—9 of Fig. 8; and

Fig. 10 is a diagrammatic view illustrative of the principle involved in the provision of the pilot rod on the bottom of the burner pan.

Referring to the drawings, the principal parts of the heater shown therein, from the bottom up, are a burner pan A, having a flat bottom adapted to rest on the ground, an annular hanger B designed to adapt the heater for the burning of solid fuel and forming the inner wall of a down draft passage, a dome-shaped combustion chamber C surmounting and vertically spaced from the top edge of the burner pan A, a hood D that, in cooperation with the contracted upper end portion of the combustion chamber C, forms an annular duct for the inflow of secondary air, and a stack E surmounting the open upper end of the combustion chamber C. All of these parts are separately made, preferably of a high grade durable sheet metal, and, when assembled, are vertically coaxial.

On the top edge of the burner pan A is an external hollow bead 10, and attached to the outer side of the side wall of the pan 10 are a plurality of brackets 11 (preferably three in number, spaced 120° apart) that preferably have the shape shown in Figs. 2 and 6 and extend somewhat above the bead 10. The combustion chamber C is formed on its lower end with an external downwardly curved flange 12 that overlaps and rests on the brackets 11, by which the lower open end of combustion chamber C is spaced vertically somewhat from the top edge of the burner pan A to provide an annular air intake mouth for the inflow of a downwardly directed primary air draft into the burner pan A. This down draft flows between the wall of the burner pan A and the adjacent wall of the annular hanger B, as clearly shown in Figs. 2 and 6. This hanger B is formed with a lateral external flange 13 on its top edge that is separably attached to the flange 12 of the combustion chamber C by the means best shown in Figs. 2 and 4, wherein 14 designates each of a group of headed studs that are secured in the flange 12 and project through keyhole slots 15 in the flange 13. The heads of the studs 14 can pass through the large ends of the slots 15, but not the narrow ends, so that, when the flanges 13 and 12 have been

brought in contact, a slight turning movement of the hanger B or the combustion chamber C locks the parts together. When so locked, they are held against accidental separation by a back-turning movement, by means of a locking stud 15' passed through registering holes in the flanges 12 and 13, as shown at the right of Fig. 2.

As shown in Figs. 2 and 6, the hanger B has an open lower end, but the lower end of the side wall of the hanger is curved inwardly as shown at 16 sufficiently to form a ledge, on which may be seated a removable grate G for use when burning solid fuel. The brackets 11 not only support the combustion chamber C but also center the latter and the grate G relatively to the burner pan.

The upper portion of the combustion chamber C is contracted, and to the outer side of the contracted portion are spot welded or otherwise attached a group of equally spaced brackets 17 each formed with a shoulder 18 that seats the lower end of the flue or stack E. In the brackets 17 just above the shoulders 18 are small holes which register with similar holes in the lower end of the stack E, and through each registering pair of holes is inserted a headed stud 19, by which the lower end of the stack E is separably attached to the combustion chamber. It will be observed that the lower open end of the stack E encircles the contracted upper end of the combustion chamber C with clearance, and this provides an annular intake mouth for secondary air to the stack.

The upper end of the hood D terminates in an integral collar 20 that can slide downwardly over the tapered stack E, and comes to rest on the brackets 17. The collar 20 of the hood, when the latter has been applied, overlaps the heads of the studs 19 and thus prevents accidental withdrawal of the studs. The hood D cooperates with the tapered contracted upper wall of the combustion chamber C to form an annular draft passage for the secondary air that communicates at its upper end with the aforesaid annular intake mouth for the secondary air to the stack.

The stack E has a deflector 40 supported therein by means of a bracket 41 attached to the adjacent portion of the combustion chamber C. Positioned thus above the open upper end of the combustion chamber C the deflector 40 causes the rising gases to be deflected toward the sides of the stack where they are mingled with the fresh air entering under the hood D.

When using oil as fuel, the grate G is, of course, omitted, and a fuel tank T, preferably of substantial size to contain enough fuel to supply the heater for several successive nights without refilling, rests on the ground adjacent to the heater, as shown in Fig. 1, and is, of course, equipped with a suitable cover 21. In the bottom of the tank T is a horizontal coil 22 (Fig. 7) comprising about five feet of copper tubing, the inner end of which is open to the oil and outer end of which extends into a coupling 23 that is screwed onto a threaded nipple 24 of a valve casing 25 extending through the side wall of the tank. Extending across the axial bore of the casing 25 is a valve 26 by which the oil flow is turned on or off. The outer end of the valve casing 25 is connected to a supply pipe 27, the other end of which pipe screws into a hollow boss 28 on the side wall of the burner pan A.

The bore 29 of the boss 28 registers with the outer end of a tapered V-shaped channel 30 formed in and radially of the bottom wall of the burner pan A. This channel 30 is tapered both lengthwise and widthwise, being widest and highest at its outer end and narrowest and lowest at its inner end.

Lying on the bottom of the channel 30 is a solid metal, round pilot rod 31 that may be attached to the bottom of the channel as by spot welding or otherwise, as indicated at 32. The pilot rod 31 is of less diameter than the bore 29, and the outer end of the pilot rod is beveled as shown at 33 to split the incoming stream of oil.

This arrangement of the pilot rod on the bottom of the burner pan A is one of the significant features of my invention that insures the efficient and economical consumption of oil when the heater is used with that kind of fuel. As indicated in full outline in the diagrammatic view of Fig. 10, this pilot rod could be placed on the flat bottom. However, in the preferred embodiment I upset a portion of the bottom to provide a channel for the rod with the curved embankments disposed laterally on opposite sides of said rod. These embankments tend to accelerate the functioning of the rod, as a pilot for the oil toward the center of the burner pan, over what would be the case were the rod to be located on a perfectly flat bottom.

In either arrangement of the rod pockets 31' and 31'' are formed on the underside of the rod between it and the contiguous portions of the bottom of the burner pan. In the preferred embodiment these pockets are reduced in size by the lateral upset portions of the pan bottom. However, this is compensated for by reason of the fact that the upwardly curved approaches to the rod tend to facilitate the diversion of the swirling flames up away from the pockets, as indicated in the arrows in Fig. 10. The advantage of such an arrangement is that the entering oil is piloted along the rod 31 toward the center of the burner pan A thus delaying its ignition until it has passed some distance away from the entering bore 29.

The coil 22 is not indispensable, but is preferably used because it creates what is known as a "laminar" flow of the oil, which is a uniform steady flow, as distinguished from a more or less irregular and spasmodic flow, due to the friction of the oil on the walls of the coil.

As shown in Figs. 2 and 5, the depending flanges 12 of the combustion chamber are extended inwardly at their lower edges as shown at 34, and in the latter are cut notches 35 (or comparable portions of the flange might be bent out) to permit the flange 12 to pass over brackets 11, following which the combustion chamber is given a slight turning movement that brings the extensions 34 across the brackets 11, so that the parts will not be accidentally separated by raising the combustion chamber.

To facilitate access to the interior of the heater when the latter is used with the grate G to burn coal, coke or wood, the side walls of the combustion chamber C and the burner pan A are locally flattened and impressed to form door frames 36 and 37 to which are hinged upper and lower doors 38 and 39, the upper door serving to supply fuel to the grate, and the lower door serving for the removal of ashes. Where the heater is designed to burn oil exclusively, the grate G and the doors 38 and 39 may, of course, be omitted.

A quick manner of assembling the parts of the heater is as follows:

The combustion chamber C is placed upside down on the floor or ground. If the grate G is

to be used, it is then set, upside down, in the combustion chamber. The hanger B is next attached to the open end of the combustion chamber by passing the key-hole slots 15 over the heads of studs 14 to bring the flanges 12 and 13 into contact and then giving the hanger a slight turn to lock the flanges together. The parts thus far assembled are then turned right side up, which causes the grate G to drop onto its annular seat 16, as shown in Fig. 6. Next the headed pin 15' is inserted to lock the flanges 12 and 13 against relative turning. The assembled parts B, C and G are then mounted on the burner pan A by passing the flange 12 down over the brackets 11 and then slightly rotating the flange 12 to lock the combustion chamber to the burner pan. The stack E is then mounted on the brackets 17, the studs 19 are inserted to lock the stack on the combustion chamber, and finally the hood D is slid down over the stack, with its collar 20 overlapping the heads of studs 19, and the heater is then ready for service.

It will be observed that no screws or bolts are employed to attach the parts to each other. In stoves and heaters which in use are subjected to high temperatures, the elimination of bolts and screws is an advantage, because of the difficulty of removing such fastenings when they become rusty and more or less warped by the heat.

The chief advantage of mounting the stack E on the combustion chamber C, with provision for entraining secondary air between the top of the combustion chamber and the lower end of the stack, lies in the fact that the rising current of secondary air mainly hugs the inner surface of the wall of the stack and forms an insulation to prevent overheating and deformation of the stack, and also prevents the accumulation of soot on the internal surface of the stack.

I have also found that the device illustrated in Figs. 7, 8 and 9 for conducting the inflowing oil to approximately the center of the bottom wall of the combustion chamber, is useful in preventing an accumulation of soot in the latter. The oil runs down between the sides of the pilot rod 31 and the side walls of the channel 30 and cracks into flames at the inner end of the rod and channel, so that only a very light layer of soot is deposited on the central portion of the bottom wall of the burner pan, and any gumming and clogging of the bore 29 where the oils enters is entirely prevented.

The parts of the heater are preferably made from an alloyed metal of the copper bearing type, which has proved to be the longest lasting and most durable sheet metal in its price class.

Variations and modifications in the details of structure and arrangement herein shown and described may be resorted to within the scope and coverage of the claims.

I claim:

1. In a heater of the class described, the combination with a burner pan having an open top, of brackets secured to the side wall of said pan and projecting above its top edge, and a combustion chamber surmounting said pan and formed with an outwardly and downwardly curved flange supported on the tops of said brackets, said flange having an inward projection continuous with its lower edge adapted to underlie said brackets and formed with notches to straddle said brackets when applying said flange to said brackets, whereby, under a relative turning movement of said combustion chamber and burner pan, said chamber and pan are locked to each other.

2. In a heater of the class described, the combination with a combustion chamber formed with a contracted open upper end portion, of brackets attached to the outer side of said contracted end portion and formed with shoulders, a stack at its lower end encircling said contracted end portion and stepped on said shoulders, means for separably fastening said stack to said brackets comprising headed studs passed through registering holes in said stack and brackets, and a removable hood having on its upper end a collar slidable down over said stack to a position covering the heads of said studs.

3. A heater of the class described comprising a substantially flat bottom and imperforate side walls forming an open-top burner-pan wherein the interior above said bottom is free of internal obstructions, an open-bottom combustion chamber of a diameter not greater than said burner-pan and having a materially restricted open-top, means for supporting said combustion chamber on said burner-pan with its open-bottom in vertically spaced alinement with the open-top of said burner-pan so as to provide an unobstructed air intake mouth extending around the entire perimeter of said parts and opening directly to the outside atmosphere, a hanger suspended from around the entire perimeter of said combustion chamber and extending a substantial distance into said burner-pan and spaced inwardly from the side walls thereof so as to provide a downdraft air passage leading from said air intake, and means for supplying fuel to said burner-pan.

4. A heater of the class described comprising a substantially flat bottom and imperforate side walls forming an open-top burner-pan wherein the interior above said bottom is free of internal obstructions, an open-bottom combustion chamber of a diameter not greater than said burner-pan and having a materially restricted open-top, means for supporting said combustion chamber on said burner-pan with its open-bottom in vertically spaced alinement with the open-top of said burner-pan so as to provide an unobstructed air intake mouth extending around the entire perimeter of said parts and opening directly to the outside atmosphere, a hanger suspended from around the entire perimeter of said combustion chamber and extending a substantial distance into said burner-pan and spaced inwardly from the side walls thereof so as to provide a downdraft air passage leading from said air intake, and means for feeding a film of oil radially onto the bottom of said burner-pan.

5. A heater of the class described comprising a substantially flat bottom and imperforate side walls forming an open-top burner-pan wherein the interior above said bottom is free of internal obstructions, an open-bottom combustion chamber of a diameter not greater than said burner-pan and having a materially restricted open-top, means for supporting said combustion chamber on said burner-pan with its open-bottom in vertically spaced alinement with the open-top of said burner-pan so as to provide an unobstructed air intake mouth extending around the entire perimeter of said parts and opening directly to the outside atmosphere, a hanger suspended from around the entire perimeter of said combustion chamber and extending a substantial distance into said burner-pan and spaced inwardly from the side walls thereof so as to provide a downdraft air passage leading from said air intake, a stack surmounting and at its lower end encircling with clearance the upper end of said

combustion chamber to form an annular intake mouth for secondary air to said stack, and means for feeding a film of oil radially onto the bottom of said burner-pan.

6. A heater of the class described comprising a substantially flat bottom and imperforate side walls forming an open-top burner-pan wherein the interior above said bottom is free of internal obstructions, an open-bottom combustion chamber of a diameter not greater than said burner-pan and having a materially restricted open-top, means for supporting said combustion chamber on said burner-pan with its open-bottom in vertically spaced alinement with the open-top of said burner-pan so as to provide an unobstructed air intake mouth extending around the entire perimeter of said parts and opening directly to the outside atmosphere, a hanger suspended from around the entire perimeter of said combustion chamber and extending a substantial distance into said burner-pan and spaced inwardly from the side walls thereof so as to provide a downdraft air passage leading from said air intake, a stack surmounting and at its lower end encircling with clearance the upper end of said combustion chamber to form an annular intake mouth for secondary air to said stack, a downwardly and outwardly flared hood of a diameter substantially equal to that of said combustion chamber secured to the lower end of said stack in concentrically spaced relationship and providing an extended secondary annular draft passage surrounding the upper end of said combustion chamber and converging toward and communicating with said secondary air intake mouth, and means for supplying fuel to said burner-pan.

7. A heater of the class described comprising a substantially flat bottom and imperforate side walls forming an open-top burner-pan wherein the interior above said bottom is free of internal obstructions, an open-bottom combustion chamber of a diameter not greater than said burner-pan and having a materially restricted open-top, means for supporting said combustion chamber on said burner-pan with its open-bottom in vertically spaced alinement with the open-top of said burner-pan so as to provide an unobstructed air intake mouth extending around the entire perimeter of said parts and opening directly to the outside atmosphere, a hanger suspended from around the entire perimeter of said combustion chamber and extending a substantial distance into said burner-pan and spaced inwardly from the side walls thereof so as to provide a downdraft air passage leading from said air intake, a solid fuel grate supported at the lower perimeter of said depending hanger, and means for supplying fuel oil to said burner-pan below said grate.

8. A heater of the class described comprising a substantially flat bottom and imperforate side walls forming an open-top burner-pan wherein the interior above said bottom is free of internal obstructions, an open-bottom combustion chamber of a diameter not greater than said burner-pan and having a materially restricted open-top and a perimetric flange extending outwardly beyond and downwardly alongside of the open end of said burner-pan, means coacting with said flange for supporting said combustion chamber on said burner-pan with its open-bottom in vertically spaced alinement with the open-top of said burner-pan so as to provide an unobstructed air intake mouth extending around the entire perimeter of said parts and opening directly to the outside atmosphere, a hanger suspended from around the entire perimeter of said combustion chamber and extending a substantial distance into said burner-pan and spaced inwardly from the side walls thereof so as to provide a downdraft air passage leading from said air intake, and means for supplying fuel to said burner-pan.

GEORGE ANDERSON.