This invention relates to oil burning apparatus and has for an object to provide an apparatus of that character in which primary air is admixed with oil vapor or gas and subsequently secondary air is flanged at 12-c to underlie the flange 10-b.

Interposed between the wall of the casing 12 and the wall of the bowl 10 is a partition 14, which has an angularly formed lower flange 14-6 arranged to contact with the underside of the bowl 10 at the flange 10-g when assembled. At its upper portion the partition 14 is provided with the vertical portion 14-b terminating in an outwardly directed peripheral flange 14-c located between flange 12-c and the bowl flange 10-b, as illustrated in Figs. 2 and 4, for example.

A number of relatively large apertures 14-z are provided in the partition 14, being of such size as to permit that amount of air to the space above the partition as is desirable for the peripheral secondary air supply.

A convex-concave clamping ring 15 is located around and clamps the flanges 12-c, 14-c and 10-b together to secure the bowl 10, partition 14 and casing 12 in assembled relation, this ring having the flanged ends 15-a secured in clamping arrangement by means of the bolt 16 (see Fig. 3). Removably mounted in the tubular portion 10-a is the stem 16-a of a central air distributor member 16, having the lower distributor head 16-b and the upper distributor head 16-c. This distributor member 16 is preferably constructed of sheet metal, the central portion being welded or otherwise suitably secured to the upper and lower distributor heads 16-b and 16-c. The lower head is provided with the horizontally directed apertures 16-d and the downwardly inclined apertures 16-e. The upper distributor head 16-c is formed of the dished bottom portion 16-f and the inverted dished top portion 16-g, the two portions being secured together by means of bolts 20 and spacer bushings 21 located at suitable intervals and shown as three in number in the embodiment illustrated. These fastening members are located well inwardly of the outer periphery of the upper distributor head and the lower member 16-f and upper member 16-g are spaced a sufficient distance to provide an annular discharge orifice 16-h, as illustrated in Fig. 2.

The central tubular portion 10-a is in communication with the air chamber 25 formed by the bowl 10 and the casing 12, and is provided with the enlarged boss 10-x near the bottom thereof, in which is located an oil supply duct 10-y. An oil supply pipe 26 leads to and is inserted in the duct 10-y, and an auxiliary air pipe 27 is connected with the oil supply pipe 26 adjacent its delivery end, the other end of such air duct being looped at 27-a and provided with
the open end 27—b located in the main air duct 13.

Communicating with one end of this air duct 13 is the outlet duct 30 of an electrically actuated fan 31, which has the air inlets 31—a, the size of which are controlled by the sliding damper 32, as illustrated in Fig. 1.

It will be noted that the partition forms with the wall of the flange 10—b a chamber which I term a reduction chamber 40, from which lead the apertures 10—f, entrance of air to this chamber 40 being possible through the ports 14—z.

In the form illustrated in Fig. 4 the ports 10—f are fixedly inclined toward the flange 10—c, as, for example, at an angle of 8° from the vertical, and the flange 10—c is slightly chamfered at a substantially similar angle, as illustrated by numeral 10—z.

Illustrates generally a gas pilot light, although any suitable form of igniter may be utilized or my burner may be operated continuously without pilot if so desired.

In the operation of the apparatus described above the damper 32 is set for proper air delivery, and with the fan in operation air may be delivered through the main air duct 13 to the chamber 25, from whence it will flow up through the tubular portion 10—a to the central air dis- tributor 16. At the same time air at reduced pressure will flow through the ports 14—c into the chamber 40, ports 14—d being of substantially less total area than the area of the apertures 10—f. Air will flow outwardly through the apertures 16—d and 16—e from primary distributor head 16—b and preferably admix with the fuel vapor resulting from the oil in the bottom of the bowl in an insufficient quantity to effect combustion or flame in the bottom during normal running operation. In such operation the oil supply in the bowl is subjected to the radiant heat of the flame which generates the necessary vapor or gas, into which is introduced and admixed the primary air flowing from the head 16—b. Secondary air will flow out substantially in a horizontal sheet through the orifice 16—h at relatively high velocity and will admix with and deflect the rising gas and air mixture from the bowl. Additional secondary air will flow upwardly through the apertures 10—f in sufficient quantity, but at reduced pressure due to the interposition of the reduction chamber 40. This air will contact and envelop the upwardly rising gas-air mixture, and due to its reduced velocity will also be deflected by the jet air distributor head 16—c, resulting in a clear, white or smoke- like flame resulting from the combustion of the initial gas-air mixture and the secondary air.

I have found that the use of the upper distributor head of the character illustrated greatly improves the character of the flame obtained and the provision of the reduction chamber 40 and its associated air delivery apertures 10—f results in the supply of sufficient peripheral secondary air but at a reduced velocity which permits the desirable deflection and shaping of the gases and flame. The central air distributor lends itself to economical and facile manufacture and permits the ready use of sheet or tubular metal.

In some instances at least the inclined apertures 10—f and chamfered flange 10—c contribute to the production of a better flame, particularly at the waist portion thereof, and also contribute to the maintenance of a cleaner bowl during operation of the burner.

The central air distributor head 16 in the form illustrated and described is particularly advantageous because it may be made of wrought metal and as sheet metal for the sections of the primary and secondary distributing members may be easily shaped by stamping operation and the flange 16—c, for example, may be readily and accurately punched, a much cheaper and easier operation than to drill the holes, as has been necessary with central distributing members of cast iron. The orifice 16—h may also be accurately determined and sized as desired by modification of spacing members 21, and that construction eliminates the necessity of any drilling or punching of holes, while giving a better secondary air distribution than where apertures are utilized.

The arrangement of the concavo-convex members 16—f, 16—g of the upper distributor head forms an enlarged chamber, the top and bottom of which converge toward the annular slot 16—h, thus constituting a pressure chamber with a relatively thin slot so that the air is discharged through the slot in a sheet form with sufficient velocity to mix with the rising gases and to deflect the same and the peripheral secondary air supply, this issuing through the apertures 10—f. Also the separate construction and the means of uniting the upper and lower members 16—f, 16—g contribute to the elimination of expansion strains or permits their absorption in such wise as to prevent or substantially pre- vent warping of the upper distributor head un- under the action of the heat from the combustion.

It will be obvious that my invention is sus- ceptible of modification and departure from the form illustrated. I do not wish to be restricted to such form except as defined in the appended claims.

What I claim is:

1. In apparatus of the class described, a bowl having an apertured flange projecting outwardly therefrom, a casing surrounding and spaced from said bowl, an apertured partition beneath and co-acting with said flange and the wall of said bowl to form a reduction chamber, means for supplying air under pressure to said casing, and means to secure said casing and partition to said flange.

2. In apparatus of the class described, a bowl having an apertured flange projecting outwardly therefrom, a casing surrounding and spaced from said bowl, an apertured partition beneath and co-acting with said flange and the wall of said bowl to form a reduction chamber, means for supplying air to said casing, and means to secure said casing and partition to said flange, said last named means comprising a clamping ring.

3. In apparatus of the class described, a bowl having an apertured flange projecting outwardly therefrom, a casing surrounding and spaced from said bowl, an apertured partition beneath and co-acting with said flange and the wall of said bowl to form a reduction chamber, means for supplying air to said casing, and means to secure said casing and partition to said flange, said last named means comprising a clamping ring, said casing and said partition being flanged for engagement with said bowl flange by said clamping ring.

4. In apparatus of the class described, a bowl having an apertured flange projecting outwardly therefrom, a second flange projecting from...
the wall of said bowl and spaced from said first named flange, a casing extending downwardly from said first named flange and surrounding and spaced from said bowl, an apertured partition plate inclined from said first flange to said second flange to form therewith and with the wall of said bowl a reduction chamber, and means for supplying air to said casing.

5. In apparatus of the class described, a bowl having a flange projecting outwardly therefrom, a second flange projecting from said first named flange, a casing extending downwardly from said first named flange and surrounding and spaced from said bowl, a partition plate inclined from said first flange to said second flange to form therewith and with the wall of said bowl a reduction chamber, said first named flange being provided with apertures leading from said reduction chamber, said partition being also provided with apertures leading to said reduction chamber, and means for supplying air to said casing.

6. In apparatus of the class described a bowl, a casing surrounding and spaced from said bowl, means to supply primary air to said bowl, a flange closing the space between said bowl and said casing, said bowl being extended upwardly beyond said first named flange to form a vertical flange, said first flange being provided with upwardly and inwardly inclined holes, said vertical flange having its outer surface inclined upwardly and inwardly, and means to supply air to the space between said bowl and casing.

7. In apparatus of the class described a bowl, a casing surrounding and spaced from said bowl, said casing forming with said bowl an air chamber means to supply primary air to said bowl, said apparatus being provided with a reduction chamber within said air chamber, said reduction chamber being provided with air inlet openings and apertures leading from said reduction chamber adjacent the periphery of said bowl, said apertures being inwardly inclined, and means to supply air to the space between said bowl and casing.

8. In apparatus of the class described a bowl, a casing surrounding and spaced from said bowl, said casing forming with said bowl an air chamber means to supply primary air to said bowl, said apparatus being provided with a reduction chamber within said air chamber, said reduction chamber being provided with openings in communication with said air chamber and apertures leading from said reduction chamber adjacent the periphery of said bowl, said apertures being inwardly inclined, said bowl being extended upwardly above said apertures to provide a vertical flange, and means to supply air to the space between said bowl and casing.

9. In apparatus of the class described, a bowl, a casing surrounding and spaced therefrom to form an air chamber, a top for said chamber located beneath the top of the bowl and apertured for the discharge of air, means for supplying air under pressure to said said chamber, said chamber being of an area less than the combined area of the apertures in said wall, whereby air at reduced velocity will flow outwardly through said apertures, means for delivering primary air into said bowl, and means for delivery of secondary air above said bowl in an outward direction.

10. In apparatus of the class described, a bowl, a casing surrounding said bowl and spaced therefrom to form an air chamber, an apertured top for said air chamber, means for supplying air to said casing, and an apertured partition in said air chamber co-acting with said top to form a reduction chamber.

11. In apparatus of the class described, a bowl, a casing surrounding said bowl and spaced therefrom to form an air chamber, an apertured top for said air chamber, means for supplying air to said casing, and an apertured partition in said air chamber co-acting with said top to form a reduction chamber, the total effective area of the apertures in said partition being less than that of the apertures in said top.

12. In apparatus of the class described, a bowl, a casing surrounding said bowl and spaced therefrom to form an air chamber, an apertured top for said air chamber, means for supplying air to said casing, and an apertured partition in said air chamber co-acting with said top to form a reduction chamber, the apertures in said partition being directed differently from those in said top.

13. In apparatus of the class described, a bowl, a casing surrounding and spaced therefrom to form an air chamber, means for supplying air to said casing, a top for said chamber located beneath the top of the bowl and apertured for the discharge of air, and means for delivering primary air into said bowl, and means for delivery of secondary air above said bowl in an outward direction.

14. In oil burning apparatus, a bowl, a laterally directed flange projecting from the wall of said bowl at the upper portion thereof, said flange being apertured for the discharge of air, an air chamber beneath said flange, means for delivering an air supply under pressure to said chamber, the air inlet to said chamber being of an area less than the combined area of the apertures in said wall, whereby air at reduced velocity will flow outwardly through said apertures, means for delivering primary air into said bowl, and means for delivery of secondary air above said bowl in an outward direction.

15. In oil burning apparatus, a bowl, a chamber provided outside of said bowl and at the upper portion thereof having its upper wall apertured for the discharge of air, means for delivering an air supply to said chamber, the air inlet to said chamber being of an area less than the combined area of the apertures in said wall, whereby air at reduced velocity will flow outwardly through said apertures, means for delivering primary air into said bowl, and means for delivery of secondary air above said bowl in an outward direction.

AUGUSTUS J. FRAME.