This invention relates to fuel burning apparatus, particularly adapted for oil burner construction in use in connection with a furnace, but also applicable to other heating apparatus where liquid fuel is utilized.

It is an object of my present invention to provide an exceedingly simple and highly efficient liquid fuel burning apparatus of the class referred to which may be manufactured and operated at very low cost.

More specifically it is an object to provide a hydrocarbon fuel burner which utilizes a rotary distributor receiving discharged liquid fuel and throwing the same downwardly in small particles minimizing danger of explosion.

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As shown in the drawing, my apparatus is applied to a more or less conventional type of hot air furnace having the usual cylindrical outer casing O and the inner casing I axially disposed therein and spaced from the outer casing to provide an annular air heating chamber which communicates at its upper end with the usual dome D for collecting the heated air and distributing the same to a number of hot air ducts.

A fire pot F is mounted in the bottom of the inner casing I and is constructed of fire clay or other suitable material capable of withstanding high temperatures. Inner casing I in its upper portion forms, of course, the usual combustion chamber and a smoke discharge flute F communicates with the upper portion of the combustion chamber.

In accordance with my invention, an elongated, downwardly extending air duct 10 open both at its upper and lower ends is mounted, preferably axially of the inner furnace casing I, as shown having its upper or air intake end disposed within the hot air dome D and enlarged, as shown, with reference to the main portion of the duct. A vertical fuel pipe 11 is axially mounted within duct 10 and communicates at its upper end with a horizontal fuel supply pipe 12 which is connected to a source of fuel (not shown). No pressure is needed on the fuel with my apparatus.

In the form of the invention shown the connection between the vertical fuel pipe 11 and the supply pipe 12 is by means of a cross-shaped fitting 13 having a plug 13a in its upper end and having one of its horizontal passages connected with supply pipe 12 by means of a suitable nipple. The opposite horizontal passage is provided with a fixed stud of supporting member 14 which, with the supply pipe, supports the pipe assembly within and axially of air duct 10. Fuel pipe 11 is open, as shown, at its lower end to form a discharge, and directly below this discharge is mounted a rotary distributing member 15, as shown of truncated conical shape, disposed axially of the lower open end of pipe 11 and preferably carrying a series of circumferentially spaced distributing arms 15a (see Fig. 6). Rotary distributor 15 is fixed to the lower end of the distributor shaft 16 which is mounted axially within oil pipe 14, the upper end thereof extending through the plug 13a in the top of the fitting 13 and rotatively mounted therein. A propeller 17, adapted to be driven by a downwardly moving flow of air through the air duct, is fixed to the upper end of distributor shaft 16 above the fitting 13 and has a hub 17a provided with a...
rounded lower end which bears against the top of the plug 25, the plug thus furnishing a suitable thrust bearing for the shaft 16 and propeller 17.

5 Spaced bearing guides 18 are provided in the interior of the fuel pipe 11 through which distributor shaft 18 passes and the oil pipe 11 is centered axially of the air duct 10 by suitable means such as two or more spaced brackets 19 (see Figs. 2 and 5). A butterfly valve 20 is mounted within the medial portion of the air duct 10 for swinging movement on a horizontal axis. The axis, it will be noted, is equalizer of the butterfly so that the butterfly will normally be disposed in an inclined position, as shown by dotted lines in Fig. 1, through gravity. In the case of a slight backdraft or puff from sudden combustion, the butterfly 28 will close, preventing upward movement of the products of combustion through the air duct.

20 Axially disposed below the lower open end of air duct 10 as well as below the rotary distributor 16 and mounted in the bottom of fire pot 2, is a shallow burner pot 21, preferably constructed of suitable material having high heat conductivity. An air supply pipe 22, as shown disposed at the bottom of the furnace and communicating with the air outside of the furnace through register 23, communicates axially with the bottom of burner pot 21 and with the interior of a hollow conical stationary distributor head 23 which is disposed axially of the pot 21 as well as of the duct 10 and rotary distributor 16. The lower edge of the stationary distributor 23 is preferably spaced a short distance above the bottom of burner pot 21 by suitable lugs or other spacing means to provide an annularly arranged air discharge passage at the lower edge of the distributor head.

Additional air discharge passages 23a are formed in the distributor head having communication with the hollow interior thereof, being disposed adjacent the upper end of the head. Also, within the upper end of stationary distributor head 23 is a suitable lighting mechanism indicated generally at 24, such as a gas pilot which is connected with a suitable gas supply pipe (not shown) and has a small jet discharge which will throw a flame outwardly of the upper portion of conical distributor head 23 when desired. Its specific construction is not shown since such structure is not of the essence of this invention.

In operation the liquid fuel is supplied to the upper end of the vertical fuel pipe 11 and passes downwardly, being discharged at the lower end of pipe 11 upon the tapered upper end of the small rotary distributor 15. When the fuel is ignited flame directed by the burner pot and fire pot spredes outwardly about the air duct 10 and produces, as the particles of distributed fuel thrown out by the rotary distributor 15, a downward draft of warm air taken from the dome of the furnace through the duct 10. This downward draft of warm air drives the propeller 17 and its associated shaft 16, thus rotating the distributor 13. The downward draft of hot air materially aids the combustion and assists in the formation of an inverted truncated conical flame in the fire pot and lower portions of the combustion chamber.

The particles of hydrocarbon fuel thrown outwardly and downwardly by the rotary distributor 15, with the assistance of gravity, fall against the conical exterior of the stationary distributor head 23, which is heated, in the operation of the device, to a high temperature. The discharged particles are efficiently and properly mixed with combustion supporting air upon the exterior of the distributor head 23 and in and about the sides 5 of the burner pot. Air is discharged outwardly and upwardly from the annular lower edge of distributor head 23 as well as from the several air ports 23a in the upper portion of the head. The amount of air supplied through the pipe 22 may be regulated by shifting the position of the register valve 21.

In said operation the particles of hydrocarbon fuel volatilize as they strike the hot conical distributor head and the downward draft of warm air from the lower end of the air duct 10 pushes the volatilized fuel outwardly with respect to the vertex of the distributor head 23 and with respect to the peripheral wall of the burner pot 21, where such volatile material is very effective 20 ly mixed with the upwardly rising air escaping below the lower edge of the distributor head as well as with the jets of air which emanate from the air passages 23a. My device, in extensive tests, has shown a high degree of efficiency in combustion and economy in combustion of fuel. No motor is required to rotate the distributor 15 and in operation the draft of air induced by the duct 10 is considered desirable. The propeller and shaft have been found to rotate, in commercial forms of the device, at about 800 R. P. M.

From the foregoing description it will be seen that I have invented a simple, economical and highly efficient hydrocarbon burner which may be very quickly and easily installed in conventional furnace structures now extensively utilized as well as in smaller heaters of various types, such as stock tank heaters, circulating air heaters for garages and small buildings and the like.

It will, of course, be understood that various changes may be made in the forms, details, proportions and arrangement of parts all within the scope of my invention.

What is claimed is:

1. In a liquid fuel burner, a downwardly extending air duct open at both its upper and lower ends, a fuel pipe disposed longitudinally within said air duct and spaced from the peripheral wall thereof, a rotary shaft disposed axially within said fuel pipe, a rotary distributor fixed to the lower portion of said shaft and having a downwardly directed lower extremity, said fuel pipe having an outlet disposed just above said rotary distributor and a burner pot disposed below said rotary distributor and having an upright distributor portion of materially greater circumference than said rotary distributor adapted to receive and volatilize particles of liquid fuel discharged from said rotary distributor and means for driving said shaft.

2. In a liquid fuel burner, a downwardly extending air duct open at both its upper and lower ends, a fuel pipe disposed longitudinally within said air duct and spaced from the peripheral wall thereof, a rotary shaft disposed axially within said fuel pipe, a rotary distributor fixed to the lower portion of said shaft and having a downwardly directed lower extremity, said fuel pipe having an outlet disposed just above said rotary distributor, a concave burner pot disposed below said rotary distributor, an upright distributor head constructed of heat conductive material and having a circum-
ference materially greater than that of said rotary distributor mounted in said burner pot in alignment with said rotary distributor and having means for discharging air outwardly therefrom.

3. In a liquid fuel burner, a casing forming a combustion chamber, a vertical air duct extending into said chamber and open at both its upper and lower ends, a fuel pipe disposed axially within said duct having a discharge adjacent the lower end of said duct, a rotary fuel disintegrator and distributor mounted axially just below and to receive from said discharge, a concave burner pot mounted below said rotary distributor, an upstanding conical head disposed axially below said rotary distributor and having a circumference materially greater than that of said rotary distributor and adapted to receive disintegrated particles of liquid fuel, means for discharging air adapted in cooperation with the lower portion of said head and said concave fire pot to project an upwardly moving inverted truncated-conical stream of air around the lower end of said air duct, and a propeller connected with said rotary distributor and mounted some distance thereabove for driving said rotary distributor.

4. In a liquid fuel burner, a casing forming a combustion chamber, a substantially vertical air duct disposed in said chamber and open at both its upper and lower ends, a rotary shaft disposed longitudinally within said air duct, means for driving said shaft, a rotary distributor having a series of circumferentially arranged depending distributing elements, said distributor being fixed to the lower portion of said shaft and disposed adjacent the lower end of said air duct, liquid fuel discharge means within said duct disposed above said rotary distributor for discharging thereon, and a burner pot disposed just below said rotary distributor and the lower end of said duct and arranged substantially concentrically therewith, said pot having a relatively large volatilizing area materially greater than the area defined by the circumference of said distributor, said area being adapted to receive particles of the liquid fuel dropped from the depending elements of said distributor, said pot having air inlet passages associated therewith for admitting an upward draft of air.

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