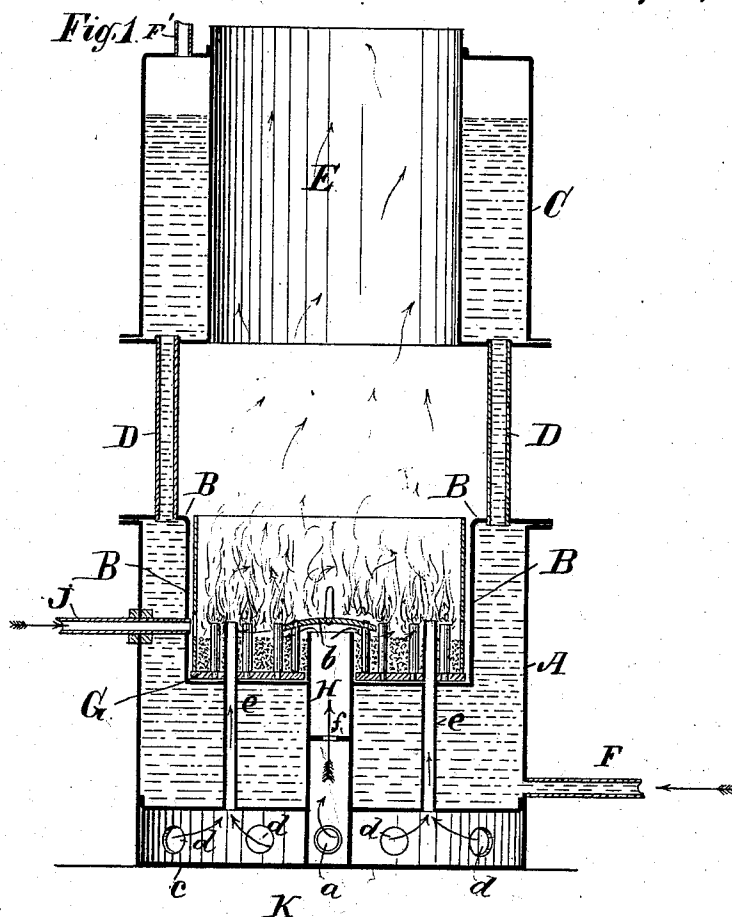


(No Model.)

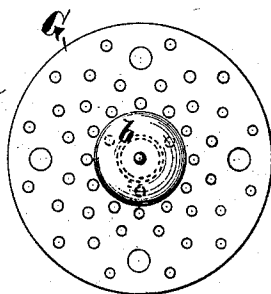
R. LIGHTHALL.  
Hydrocarbon Burner.

**No. 241,773.**

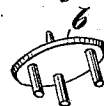
**Patented May 17, 1881.**



*Fig. 2.*



*Fig. 3.*



*Witnesses:*

Henry Gidding  
Allen Vermilya

*Inventor:*

Perden Lighthall.  
by J. W. Hatch  
his atty.

# UNITED STATES PATENT OFFICE.

REUBEN LIGHTHALL, OF BROOKLYN, NEW YORK.

## HYDROCARBON-BURNER.

SPECIFICATION forming part of Letters Patent No. 241,773, dated May 17, 1881.

Application filed September 23, 1880. (No model.)

*To all whom it may concern:*

Be it known that I, REUBEN LIGHTHALL, of the city of Brooklyn, in the county of Kings and the State of New York, have invented an Improvement in Apparatus for Burning Liquid Hydrocarbons, of which the following is a specification, reference being had to the accompanying drawings, forming part of the same, in which—

10 Figure 1 is a vertical central section of my improved apparatus. Fig. 2 is a top face view of a false bottom in the fire-place of the apparatus, removed from its place therein; and Fig. 3 is a perspective view of an air-deflector, 15 both being more particularly described hereinafter.

The object of my invention is to produce an active and complete combustion of petroleum and other hydrocarbons for heating purposes 20 in furnaces, steam-boilers, &c.; and it consists in the devices and combination of devices hereinafter described and claimed.

A represents a tank or vessel for holding water, and B the fire-pot, that sets down into 25 A, the two being secured together at the top, so that when A is filled with water the water will surround B and be in contact with its walls and bottom.

C is a second closed tank or receptacle, elevated above A; and D indicates pipes, of which 30 there may be four or more, communicating between C and A.

E is the fire-flue, which runs up through the center of C, thus making the tank C an annu- 35 lar receptacle.

F is the water-inlet pipe for conducting the water into A at or near the bottom, and F' is an exhaust-pipe, from which steam may escape from C.

40 I place in the fire-pot B a false bottom, G, which is a metal disk loosely filling the said fire-pot, and in this disk I set a number of metal pins, that project upward from the said false bottom, and are of a length corresponding to 45 about one-third of the depth of the fire-pot. I then cover the said false bottom with a layer of some coarse incombustible material, preferably asbestos, said material reaching to nearly the upper end of said pins.

50 H is an air pipe or conductor, through which air is to be forced into the fire-pot through the

opening *a*, from which an air-pipe is to lead to a blower or other instrumentality for forcing a current of air. This pipe H extends up into the fire-pot a little above the upper surface of the asbestos, and nearly to the level of the upper end of the aforesaid pins. Over this tube H, I place a deflector, *b*, which is a metal disk somewhat larger in diameter than the open end of H, and preferably concave on the under side, 60 as shown. It is raised a little above the open end of H, being supported on legs or pins, the lower end of which rests on the false bottom G.

I preferably place loosely in the fire-pot a metal cylinder, I, which rests down upon the false bottom B, and extends upward to the top of the fire-pot. It may be of a diameter about or nearly equal to that of the fire-pot, so that it will be nearly or quite in contact with the inner surface of the sides of the fire-pot. J is 65 a pipe leading into the fire-pot and opening therein just about on or a little above the level of the asbestos. This is for the introduction of the hydrocarbon into the fire-pot.

I form an air-chamber, K, underneath the 75 tank A by attaching thereto a second bottom, *c*, at a distance from the true bottom of about one sixth or eighth of the entire depth of A. The side wall of this chamber is perforated with a number of holes or openings, *d*, for the admission of air; and *e* designates a number of pipes leading from said air-chamber upward and into the fire-pot B, and opening therein a little above the level of the asbestos.

I preferably place in the pipe H a diaphragm, 85 *f*, through the center of which I make an aperture of considerably less diameter than the pipe, whereby the air may be forced in through the pipe under considerable pressure, and yet caused to enter the fire-pot with less velocity 90 than if forced through the pipe H unobstructed.

In using this apparatus the hydrocarbon is introduced into the fire-pot until it rises to the level of the upper surface of the asbestos, and is then ignited. The flame will fill the fire-pot 95 and heat the tops of the pins that are set in the false bottom B, so as to vaporize the hydrocarbon, and thus increase and intensify the flame. The fire-pot itself is prevented from being injured by the intense heat by the water 100 surrounding it in the tank A, and the pins referred to, while they will become sufficiently

heated to cause the vaporization of the hydrocarbon, being in contact with the false bottom G, and that with the bottom of the fire-pot B, which is in contact with the water in A, are also protected from the destructive action of the fire upon their upper ends. The cylinder I also becomes greatly heated and contributes to the vaporization of the hydrocarbon, while it is likewise protected from the destructive action of the flame by its proximity to or contact with the sides of the fire-pot. Air to support the combustion is intended to be forced in through the pipe H, which, as it enters the fire-pot, is deflected by the deflector *b* and distributed into the flame. Air is also, in a measure, supplied through the pipes *e*, it being heated in some degree in the chamber K, and thereby a circulation of air into the fire is established through said pipes. The circulation of water will, of course, take place in the water tanks or receptacles through the pipes D, the water, as it is heated in A, rising up through the said pipes D into C, and the colder water in C at the same time passing down through said pipes into A.

If desired, the upper tank, C, and the pipes D may be dispensed with, and the fire-flue E be made to rise directly from the fire-pot B.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In an apparatus for burning hydrocarbon, containing the water-tank A, fire-pot B, and pipes F and J, as described, the combination therewith of the false bottom G, provided with upward-projecting pins, and covered on its upper surface with asbestos, as and for the purpose specified.

2. The combination of the tank A, fire-pot B, the false bottom G, provided with the metal pins and incombustible material described, the pipes F and J, the air-chamber K, and air-pipes *e*, as and for the purpose described.

3. The combination of the tank A, fire-pot B, false bottom G, provided with the metal pins and incombustible material described, pipes F and J, the pipe H, and deflector *b*, as and for the purpose specified.

4. The combination of the tank A, fire-pot B, false bottom G, provided with the metal pins and incombustible material described, air-pipe H, pipe J, tank C, pipes *e*, and fire-flue E, as and for the purpose specified.

In witness whereof I hereto set my hand this 22d of September, 1880.

REUBEN LIGTHALL.

Witnesses:

HENRY EIDLING,

ALLEN G. N. VERMILYA.