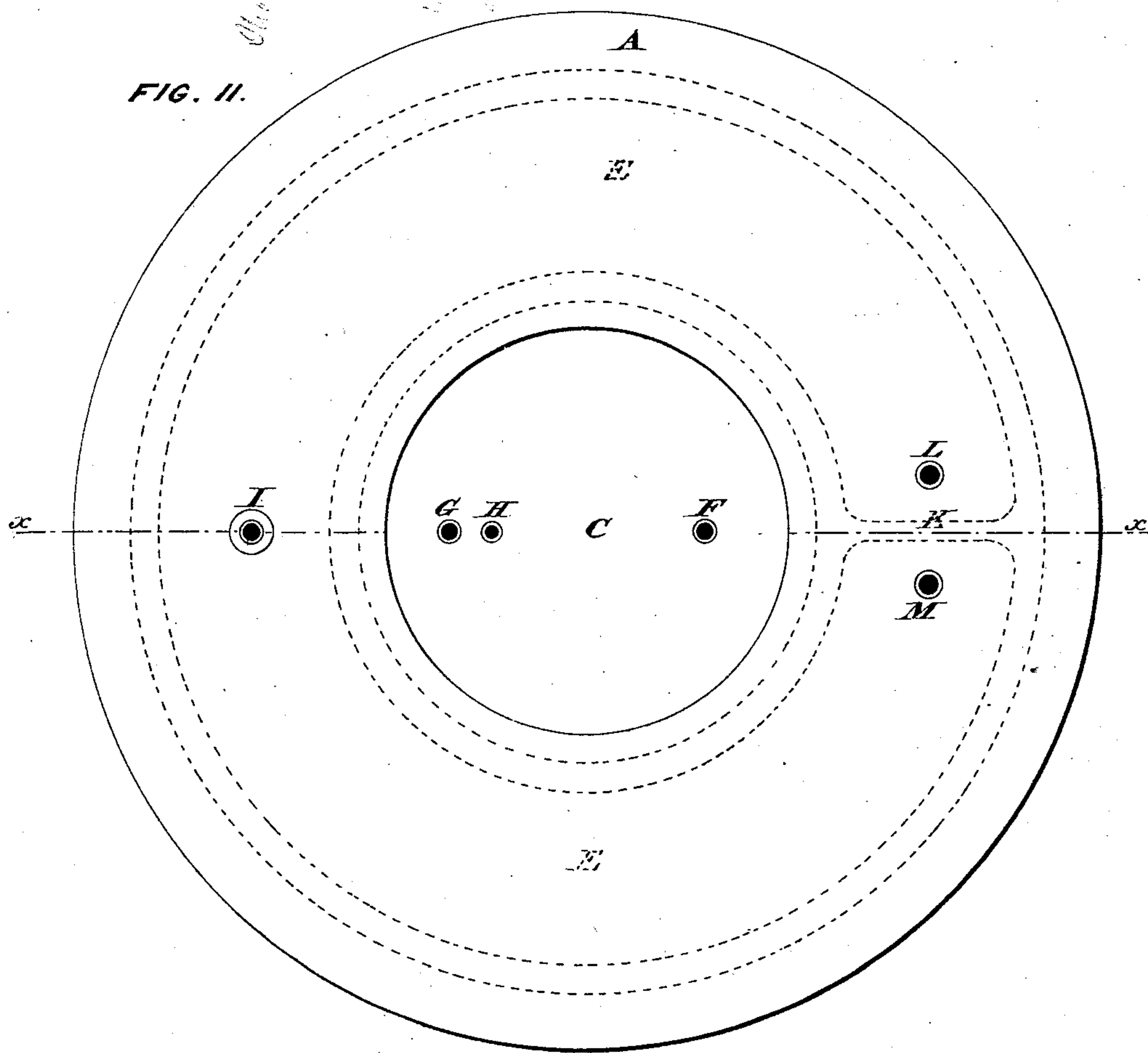
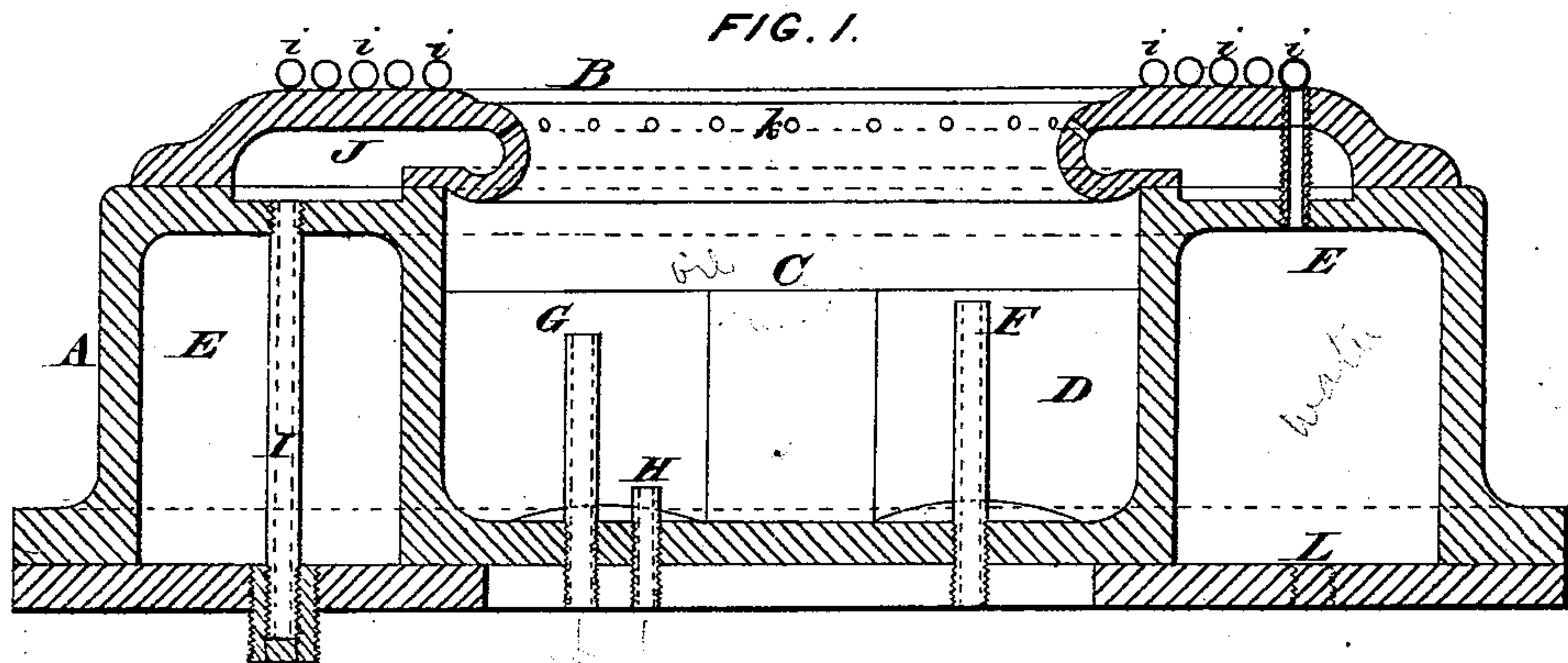


O. T. EARLE.
Burning Hydro-Carbons.

No. 159,751.

Patented Feb. 16, 1875.



WITNESSES:

Geo. W. Stokes.
Chas. J. Hedrick.

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UNITED STATES PATENT OFFICE.

OSCAR T. EARLE, OF NEW YORK, N. Y.

IMPROVEMENT IN BURNING HYDROCARBONS.

Specification forming part of Letters Patent No. **159,751**, dated February 16, 1875; application filed August 8, 1874.

To all whom it may concern:

Be it known that I, OSCAR T. EARLE, of the city, county, and State of New York, have invented certain new and useful Improvements in Burning Hydrocarbons; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification, in which—

Figure 1 is a vertical section through line *x x* of Fig. 2, and Fig. 2 a bottom view.

It has long been a matter of great importance to inventors and others to discover a suitable means by which the immense quantities of petroleum, naphtha, and asphalt can be used as fuel. The cheapness of these fluids and the great heat evolved by them when burned supply potent arguments for applying them to purposes for which more expensive combustibles, such as coal, wood, &c., are now used, and especially to the generation of steam for mechanical purposes.

Heretofore, hydrocarbons have been burned as fuel, either by igniting them in a liquid state or vaporizing them and mixing with steam and air, or by converting them into permanent gas. There have, however, been practical difficulties in carrying out any of these inventions, so that up to the present time very little of the immense supplies of petroleum, naphtha, and asphalt are used as fuel. The difficulties are the regulating the supply of vapor when made directly from the oil, the keeping a due admixture of air or steam so as to effect perfect combustion, the maintaining a constant but limited supply of oil near the burner so as to avoid danger from breaking of the apparatus, the great cost, and the inconvenient and cumbersome arrangements of parts of the apparatus heretofore designed for this purpose, and the destruction of the burner from the greatness of the heat produced.

By my invention these difficulties which have heretofore prevented the general use of these cheap fuels are overcome. At a small cost I furnish an apparatus which combines in itself, in a compact form, a heater for the feed-

water of a boiler, which may also be used as a producer of superheated steam to be used in burning the oils, a heater or superheater for a blast of air or steam, for combining with the burning vapors, and a ready, cheap, and portable burner or furnace. I prevent, by surrounding the chamber in which the oils are burned with water, the burning or melting of the material of which it is made, and, by using this water as feed-water for a boiler, or by generating from it steam to be superheated and combined with the burning hydrocarbons, I utilize all the heat produced, and effect a great saving of the oil. I regulate by stop-cocks the supplies of oil, and of the air or steam, so that the quantity of burning oil is easily and simply controlled, and a due admixture of air or superheated steam, to insure perfect combustion is effected. The oil floats upon water, through which a new supply is admitted, and thus a constant though limited supply is furnished to the burner with but little danger should breakage occur.

The following description will enable those skilled in the art to make and use my invention:

The apparatus consists of a central chamber, C, provided with pipes G, H, and F, an air or steam superheater, B, with inlet-pipe I, chamber J, and outlet-holes *k k*, and an outer chamber, E, with pipes L, M, and N, coil of pipe *i i i* having outlet-holes in the inner circle and crossed by a partition, K.

The operation is as follows: The burner having been placed in position, water is admitted into the chamber C by the pipe G, which serves also as an overflow-pipe to regulate the same. When the chamber is filled to the overflow-point, the oil is admitted through the pipe H until a depth of about three inches floats on the water. Water is then admitted into the outer chamber E by the inlet-pipe L and fills it. The oil is now ready to be lighted. After lighting, a jet of steam or air is turned on, which enters the chamber J by pipe I, where, if air, it becomes heated, if steam, superheated, and, rushing through openings *k k* in the walls of the chamber J into or just over the oil-chamber, combines with the burning vapors of the hydrocarbons, producing an intense heat.

When used in connection with a steam-

boiler, the feed-water is admitted by pipe L, and, being compelled by the partition K across the chamber E to pass entirely around the circumference of the oil-chamber C, and while it prevents the destruction of the walls of the chamber C by the intense heat, becomes itself heated, and is conducted by the outlet-pipe M into the boiler almost at a steam heat.

When used in moving bodies a swash-plate, D, or device to prevent the liquid from spilling, is used.

When it is desired to burn hydrocarbons without being connected with a boiler, as for heating in a forge, &c., the outlet-pipe M of chamber E is closed. The chamber is kept filled to the proper height through the inlet-pipe L. Air is forced through the pipe I, chamber J, and holes *k k*, as above. After the oil is lighted steam is generated in the chamber E, passes up through pipe N into the coil of pipe *i i i*, and in passing through this coil becomes superheated. It escapes through holes in the inner circle of the coil, and unites with the burning vapors of the hydrocarbons. Water continually enters through the pipe L to supply the place of that turned into steam, and thus a continual flow is produced, which cools the walls of chamber C, and prevents their being burned or melted, as does the flow of the feed-water when a boiler is used in connection. As soon as the generation of the steam has well set in, the air-blast, through pipe I, may be discontinued, or may be used, together with the superheated steam, from the coil *i i i*.

A is the main shell of the burner. The pipe H, besides admitting the oil into the chamber C, is also used to empty the chamber. The pipe F is used to draw off the heavier portions of the liquids after the lighter products have been consumed.

The invention does not consist in the special form of the apparatus, as this will be varied to suit each special application, such as generating steam, smelting and heating metals, burning bricks, lime, pottery, and cement, roasting and reducing ores, tempering and annealing metals, and melting glass, warming buildings, distilling oils and spirits, and in evaporating sugar solutions, brine, and other liquids.

Having therefore described my invention, what I claim, and desire to secure by Letters Patent, is—

1. Surrounding the chamber in which hydrocarbons are burned by water, so as to keep the walls thereof cool, and prevent their being burned or melted, as described.

2. The chamber E, with inlet-pipe L, outlet-pipe M, and partition K, to hold the water for cooling and protecting the walls of the burning chamber from being burned or melted, and also to serve as a feed-water heater when used in connection with a boiler, as set forth.

3. The chamber E, with pipes L and N, and coil of pipe *i i i*, so as to keep the walls of the burning chamber cool, and to produce superheated steam, to be combined with the burning hydrocarbon vapors, as set forth.

4. The combination of a chamber for burning hydrocarbons, a feed-water heater, or superheated-steam producer, and a heater for an air or steam blast, as described.

In testimony that I claim the foregoing as my own invention I affixed my signature in presence of two witnesses.

OSCAR T. EARLE.

Witnesses:

WM. H. MINNIX.

CHAS. J. HEDRICK.