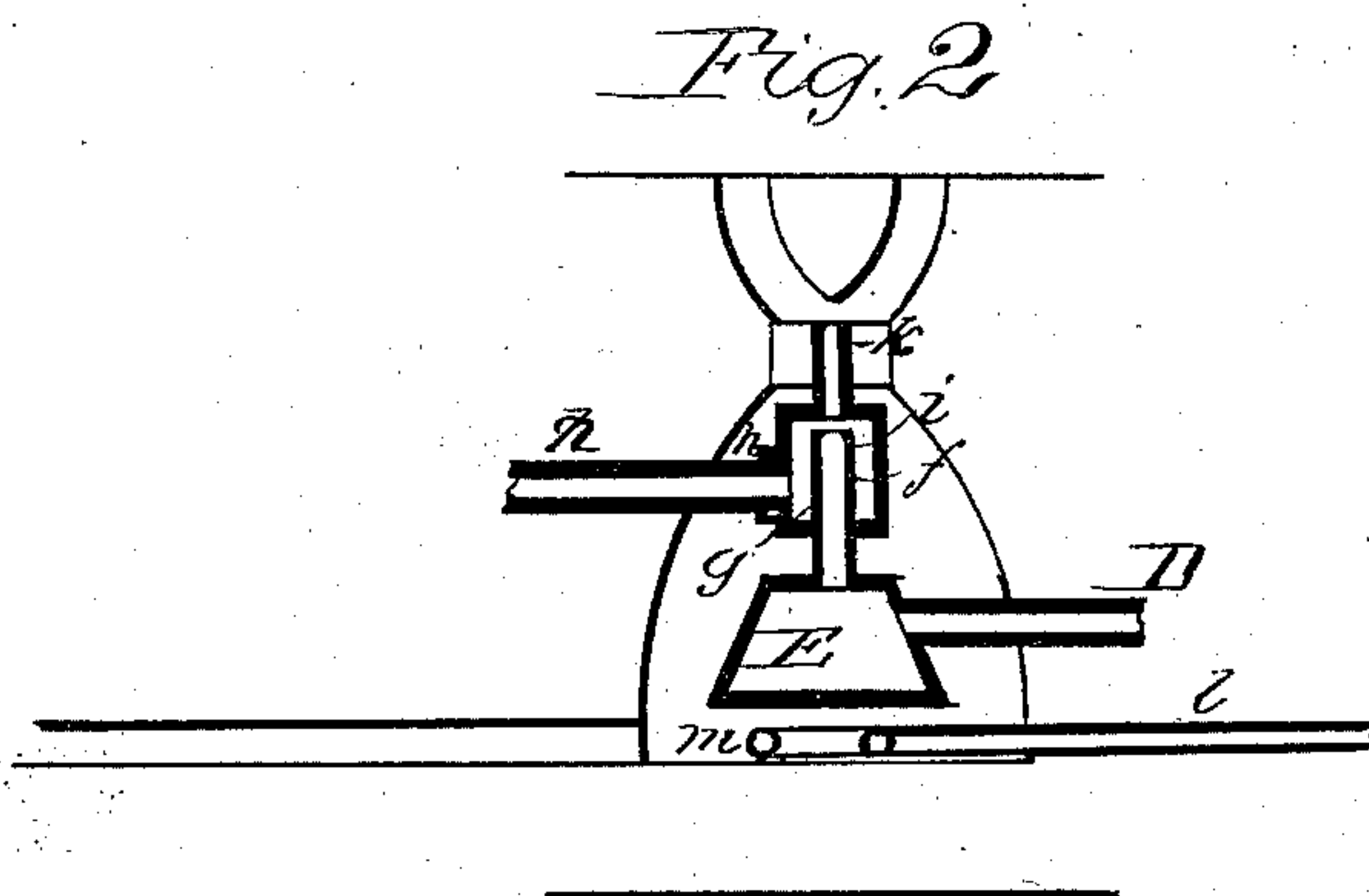
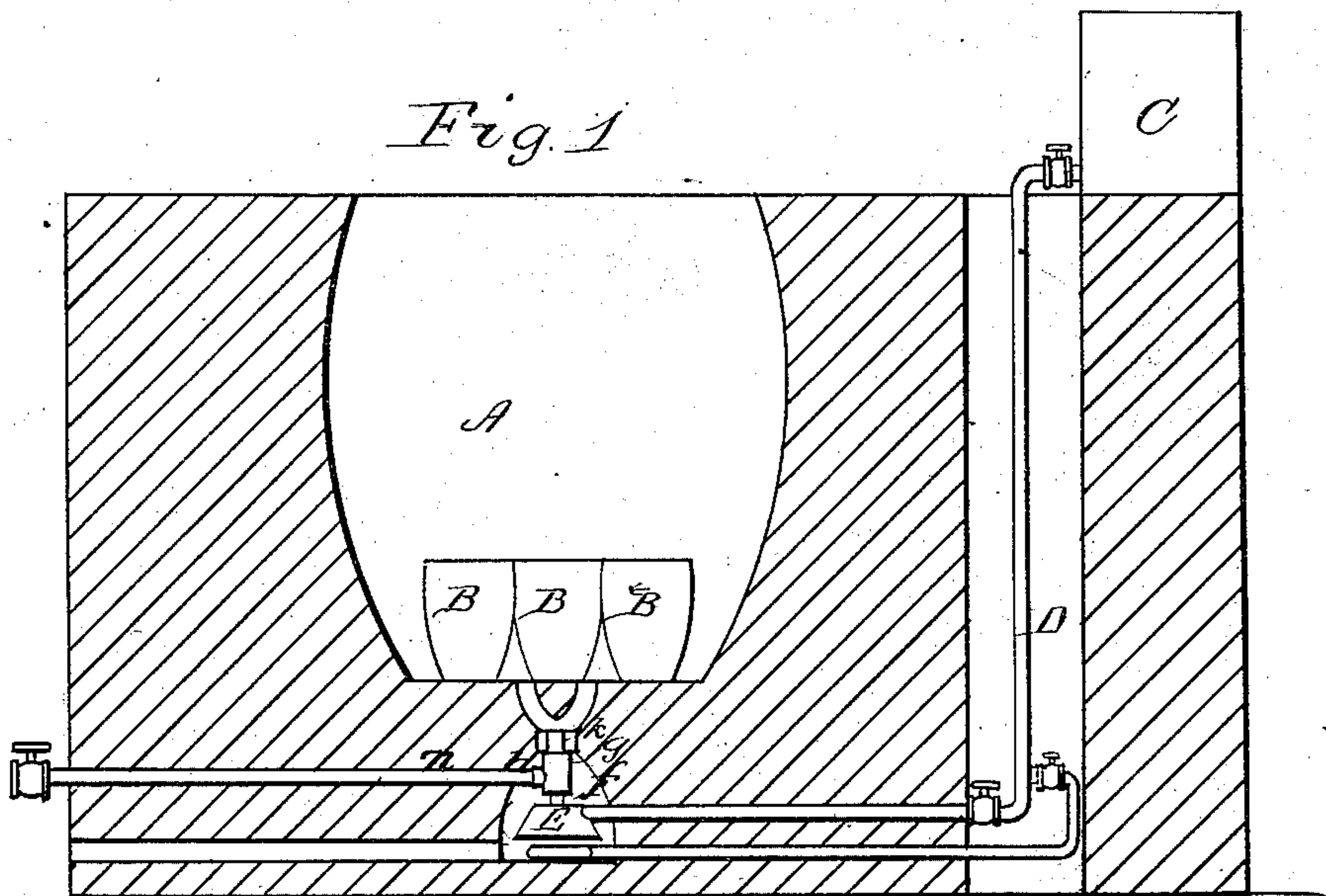


R. S. ROBERTSON.  
Hydrocarbon-Burner.

No. 222,156.

Patented Dec. 2, 1879.



WITNESSES.

*Wm Beale Hale.*  
*B. M. Griggs,*

*R. S. Robertson*  
INVENTOR

By

*Connelly Brooks Fyfe*

ATTORNEYS



# UNITED STATES PATENT OFFICE.

RICHARD S. ROBERTSON, OF PITTSBURG, PENNSYLVANIA.

## IMPROVEMENT IN HYDROCARBON-BURNERS.

Specification forming part of Letters Patent No. 222,156, dated December 2, 1879; application filed December 11, 1878.

*To all whom it may concern:*

Be it known that I, RICHARD S. ROBERTSON, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Hydrocarbon-Burners; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Figure 1 is a longitudinal section of a steel-melting furnace with my burner. Fig. 2 is a sectional elevation of my invention.

My invention has relation to a novel apparatus for burning hydrocarbons; and it consists, mainly, in the combination of a vaporizing-retort and a vapor-pipe extending therefrom, and terminating in a vapor-jet inside a chamber, said chamber having an air-inlet to the rear of, and a nozzle or outlet in front of, the vapor-jet, and being otherwise closed, whereby the vapor generated in the retort draws air into the chamber, which, mingling with the vapor, is expelled at the nozzle for ignition.

I will illustrate and describe my invention as applied to steel-melting furnaces.

In the accompanying drawings, A designates the melting-pit of a crucible or pot furnace, in which it may be desirable to melt the contents of the pots B.

A reservoir, C, contains the hydrocarbon, preferably benzine, and from this extends a feed-pipe, D, supplying the hydrocarbon to a suitable retort, E, placed in a recess below the floor of the melting-pit. From the retort E extends upwardly the vapor-pipe *f* into a T-joint, *g*, having the lateral branch *h*. The vapor-pipe *f* terminates in a jet, *i*, at a point beyond the lateral branch *h* of joint *g*, and into the upper end of the joint *g* is fixed a short jet-pipe, *k*, of smaller bore than the joint *g*. This jet-pipe *k* may extend directly above the floor of the melting-pit at its center, or may end in branches leading to several points on the floor.

Though other modes of heating the retort E may be used, I prefer to adopt the method

shown, consisting in leading a branch pipe, *l*, from the main feed-pipe to a hydrocarbon-burner, of any known form, under the retort.

Valves may be placed at convenient points for regulating the feed and for starting and stopping the same, either with reference to the burner or to the retort.

The operation is as follows: All being in readiness, I start the supply into the auxiliary burner *m* and light it. After the retort has become somewhat heated I permit the hydrocarbon to pass into it continuously from the reservoir. It is instantly converted into an expansive vapor, which is highly inflammable when supplied with oxygen. Urged by its expansive force, the vapor passes up through the pipe *f* and through the jet *i*, at which point its forcible exit tends to create a vacuum in the surrounding chamber *g*. Air rushes in through the branch *h*, for which purpose it is supplied with a pipe, *n*, taking the air in at some convenient point. This is carried upward by the momentum of the jet, and, mingling with the hot vapor, ignites it, and at once produces a most intensely hot smokeless flame.

There is no sulphur to contaminate the material under manipulation, no smoke, no dirt, no sudden falling of temperature owing to fresh charges of fuel, no waste, no cinders, no slag, in fact none of the troubles and annoyances common to solid-fuel furnaces; and while thus obtaining the highest possible heat with the least smoke and dirt, the cost of maintaining the heat is far below the lowest at present known. The economy is almost perfect, no heat being lost beyond the very small amount lost in heating the small retort for producing the vapor, and that lost by conduction through the walls of the apparatus, while the heat taken to heat the retort is actually utilized to a great extent, owing to the construction of the retort-casing, which causes the heat to rise into the furnace and there become effective.

By having the air-inlet pipe very large, and its opening controlled by a valve conveniently placed, I can govern the length of the flame exactly, according to the uses to which it is to be applied.

The heat rising, as already described, from



the auxiliary burner serves to ignite the main or furnace burner.

It is obvious that the air, prior to its being admitted to support combustion, may be heated, and for this purpose any of the well-known air-heating contrivances adapted to such uses may be employed.

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

1. The combination, in a hydrocarbon-burner, of a vapor-producing retort, an air-injector, consisting of a nozzle delivering the vapor from said retort, and terminating in a chamber having an inlet at its side for the admission of air, and a contracted blast-pipe, forming the outlet from said chamber, substantially as described, whereby the vapor, by its expansive force, draws a supply of air, and the contracted throat of the blast-pipe causes the va-

por and air to thoroughly intermingle before issuing therefrom for ignition.

2. In an apparatus for burning hydrocarbon-vapor, the combination, with the combustion-chamber, the vaporizing-retort, and the auxiliary heater thereof, of a separate and distinct confining casing or chamber surrounding the retort and auxiliary heater, and leading the heat from the latter to the retort and into the combustion-chamber, substantially as described.

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

RICHARD S. ROBERTSON.

Witnesses:

THOS. A. CONNOLLY,

THOS. J. MCTIGHE.