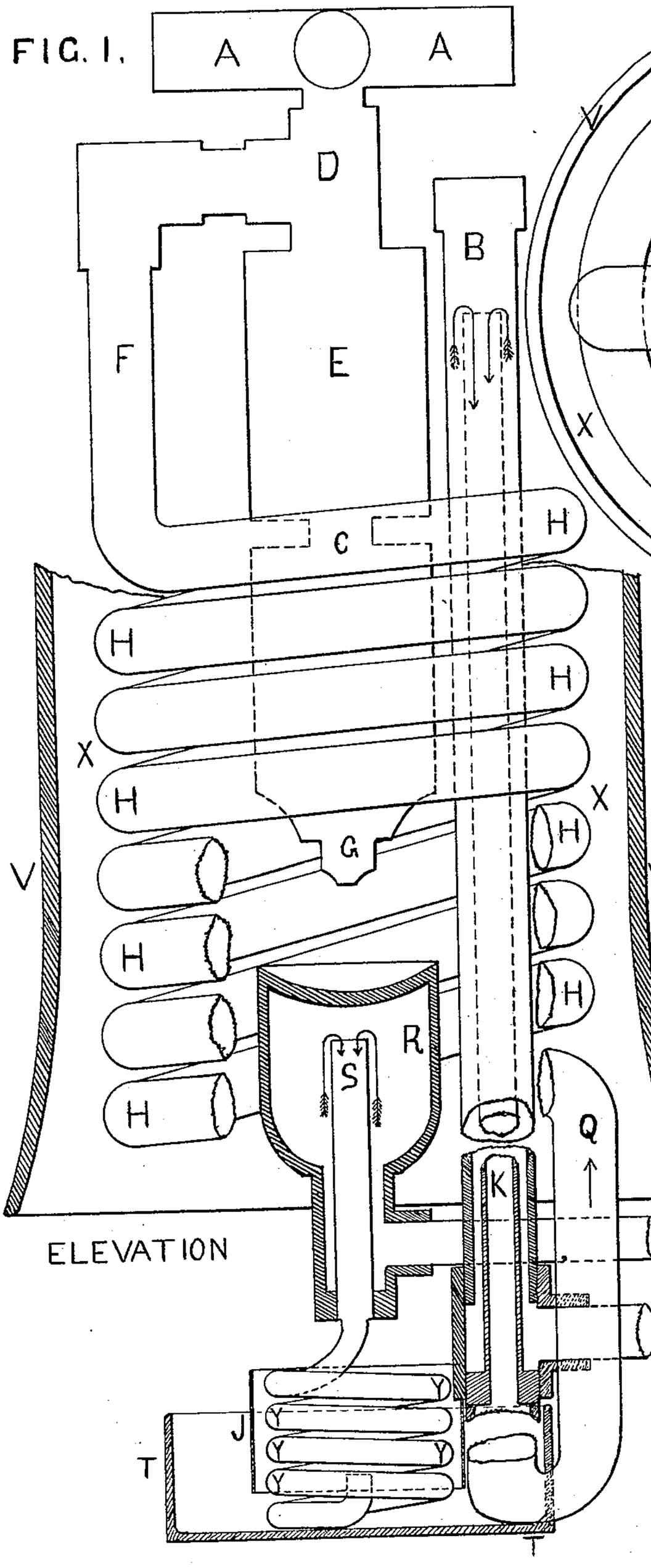
(No Model.)

# D. M. GRAHAM.

## Hydrocarbon Burners.

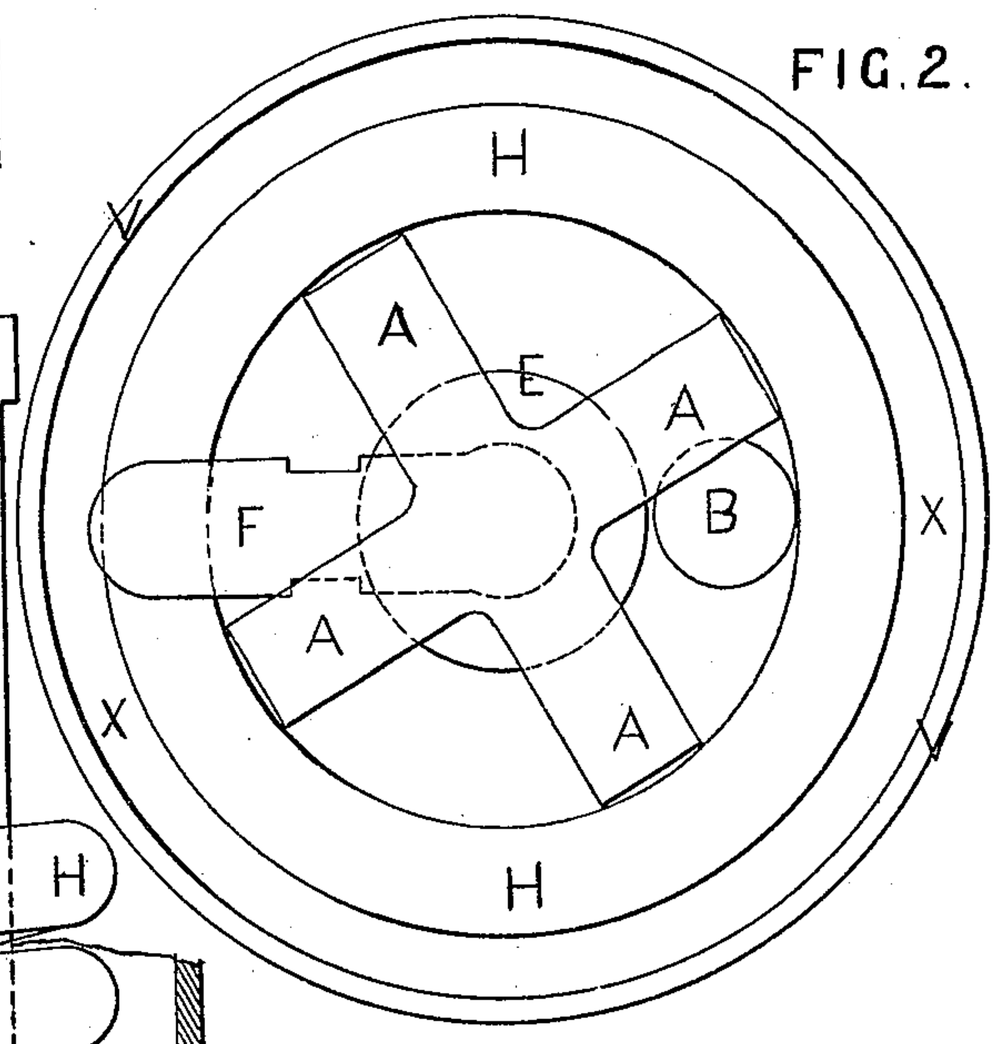
No. 234,468. **Patented Nov. 16, 1880.**

FIG. 1.




ELEVATION

FIG. 2.




PLAN

*Witnesses.*

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# UNITED STATES PATENT OFFICE.

DANIEL M. GRAHAM, OF CHICAGO, ILLINOIS.

## HYDROCARBON-BURNER.

SPECIFICATION forming part of Letters Patent No. 234,468, dated November 16, 1880.

Application filed July 3, 1880. (No model.)

*To all whom it may concern:*

Be it known that I, DANIEL M. GRAHAM, of Chicago, of the county of Cook and State of Illinois, have invented a new and useful Improvement in Hydrocarbon-Burners in connection with air; and I do hereby declare the same to be described in the following specification and represented in the accompanying drawings, of which—

Figure 1 is a sectional elevation, and Fig. 2 is a top view, of an apparatus containing my invention, the nature of which is duly set forth in the claims hereinafter presented.

In Fig. 1 of the drawings, U denotes a conduit for supplying petroleum to the apparatus, such conduit having two branch pipes, M N, leading from it, as represented, they being provided with stop-cocks L and P. The pipe M leads into the lower part or neck of a retort, R, whose top is cancavo-convex, as shown.

A pipe, S, arranged concentrically within the retort R and open at top, communicates at its lower end with or opens into a helical coil, Y, arranged within a pan or cistern, T, and surrounded by a tube, J, which also enters the vessel T, and is open at top and bottom, all being as shown. The lower end of the coil is open and turned upward in the axis of the said coil.

The coil Y, its air-tube J, and pan or vessel T, I term a "kindler," the retort R and tube S being auxiliaries of it and serving to aid in the vaporizing of the hydrocarbon. The said vessel T is to contain asbestus or some other proper equivalent heat-resisting medium and liquid-absorbent. The said vessel T, on being supplied with a suitable amount of petroleum, answers, when the petroleum is inflamed, to heat the coil and the parts of the apparatus in the vicinity thereof, so as to vaporize the petroleum let into the retort. The combustible vapors thus generated will flow into and down the pipe S and through and out of the coil, and will be burned at the upturned end of the latter and aid in heating the retort and the parts around and above it and within the air-tube V. Air will enter and pass through the tube J, and, as in a Bunsen burner, will supply the flame of the kindler with oxygen to increase its heat.

The pipe N leads into a stand-pipe, B, which, extended upward within another and larger coil, H, arranged within the air-tube V, as shown, is closed at top and bottom.

Concentrically with the stand-pipe B is another pipe, K, which is open at top, and extends up from the bottom of the stand-pipe and opens through such bottom into the lower end of a pipe, Q, that communicates with or is a continuation of the coil H. The said coil H, by a pipe, F, leading from its upper part, communicates with the neck D of another or duplex retort, E, composed of two drums united by a short tubular neck, C, the lower of such drums, at its lower end, being provided with a gas-jet, G, which is immediately over the crown of the retort R.

Arranged in the top of the neck D, and to open into it, is a cross, A, whose arms are tubular, and should be provided with gas-jets or discharge-holes leading out of their lower parts.

On petroleum being let into the stand-pipe B by the pipe N it will flow upward in the stand-pipe, and, being heated, will be more or less vaporized, the vapors passing into and down the pipe K, and thence up the pipe Q into and through the coil H and up through the pipe F, and thence into the duplex retort E and the cross A, and out of them by their jets or holes of discharge, such vapors in the meantime being highly heated or superheated and rendered to a condition for being burned to great advantage in connection with the air that may flow up through the encompassing-tube V, which tube may extend above the cross A, or to any suitable altitude. The flame resulting from the combustion of the air and superheated petroleum-vapor may be utilized to great advantage for heating purposes.

In my experiments with retorts or apparatus for vaporizing and burning hydrocarbons I have become convinced that, owing to the liability of the combustible vapors to condense, they should be superheated or reduced to gas in order for them to be burned with the best success with air in what is usually known as the "Bunsen burner." To effect the desired superheating of the vapor it had to be passed through a pipe or coil at a red heat, and to maintain such coil at such a temperature it requires to be inclosed, so as to prevent the

ready escape of the heat. The vapor thus superheated must be carried in the hot metal to the point of ignition.

A kindling or auxiliary apparatus for heating the retort to cause it to produce the gas or superheated vapor becomes a necessary adjunct to the retort, it being represented in the drawings by the asbestus-receiver T, the coil Y, and the air-tube J, supplementary to which are the lower retort, R, and its educt S, the stand-pipe B, and its exit-pipe K.

With my apparatus I can successfully vaporize kerosene and superheat the vapor and produce with it and air a blue-and-violet flame having a temperature beyond what is called "white heat." I am able, with slight detriment, if any, to the combustion, to keep a small fire in the kindler while the main retort is in operation—a matter of great importance at times, particularly when there may be a sudden demand for a large fire.

The gas issuing from the burner G strikes the concavity on the top of the retort R, and by it is reflected upward into the space in and around the coil H and around the retort E, and, meeting the jets of flame thrown downward from the arms of the cross A, is retarded in its upward flow, whereby it, with them, is caused to heat the coil and retort to great effect.

The stand-pipe and its educt, arranged within the coil H, contribute greatly to the conversion of petroleum into vapor and to the superheating of it.

What I claim as my invention is as follows, viz:

1. The combination of the kindler, substantially as described, consisting of the receiver T, coil Y, and tube J, with means, essentially as set forth, of superheating the petroleum or hydrocarbon and discharging and burning the gas produced thereby, such consisting of the tubular case V, coil H, and the retort E, provided with the discharging-cross A and jet G, all being to operate as set forth.

2. The retort R, its pipe S, and the kindler or receiver T, air-pipe J, and coil Y, arranged and applied as set forth, in combination with the superheater consisting of the tubular air-case V, coil H, and the retort E, having means of discharging gas from it, as set forth.

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Witnesses:
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