

F. M. WAREHAM.
Hydrocarbon-Burner.

No. 223,084.

Patented Dec. 30, 1879.

Fig 1

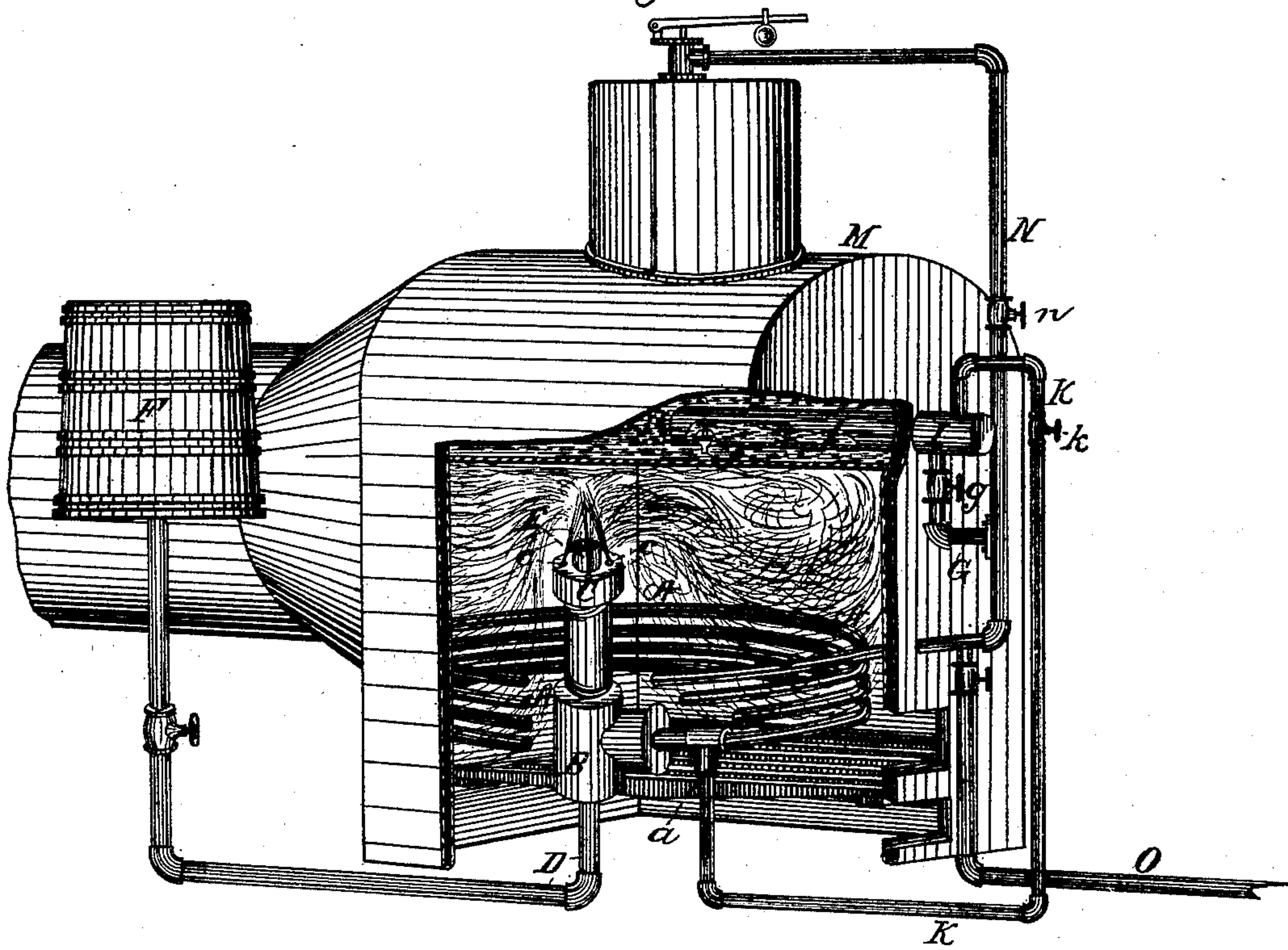


Fig. 3,

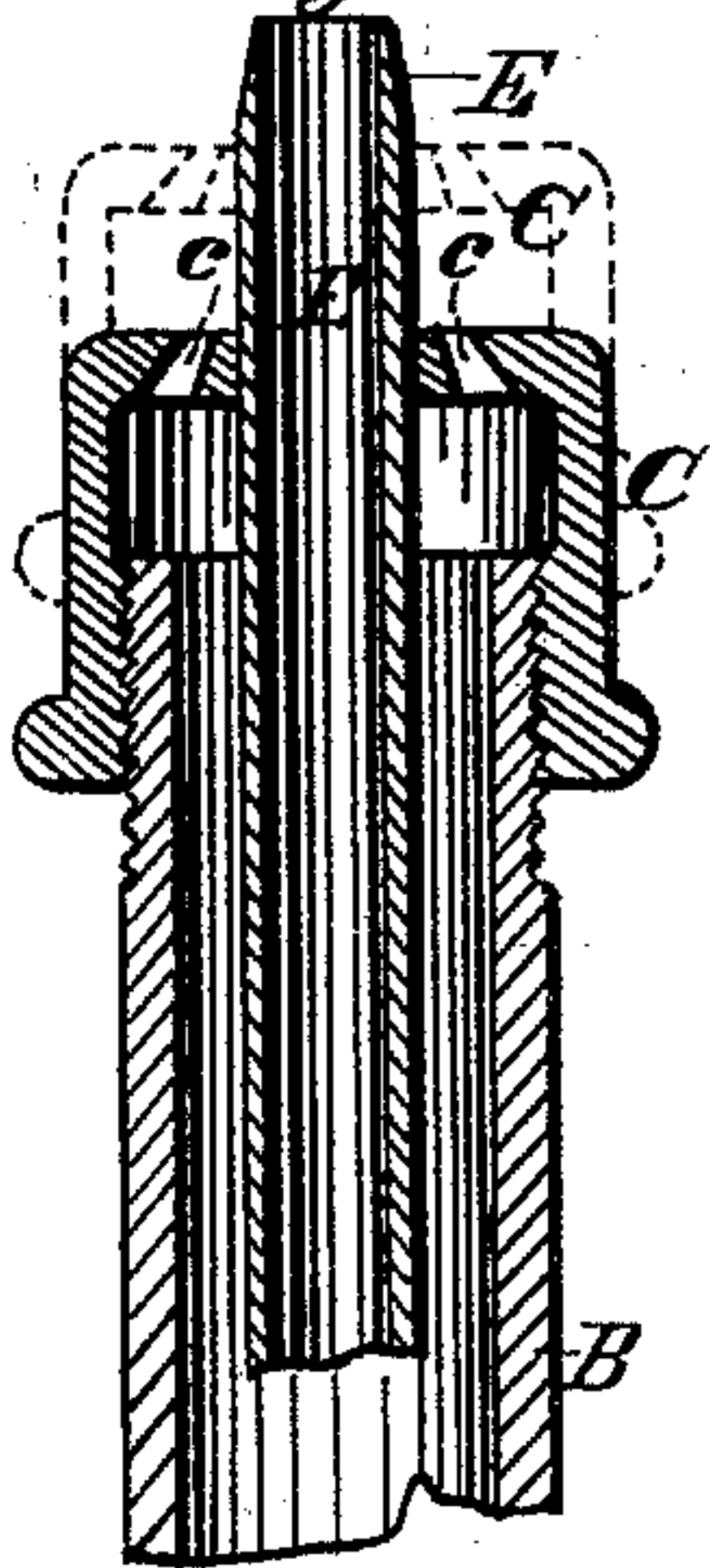
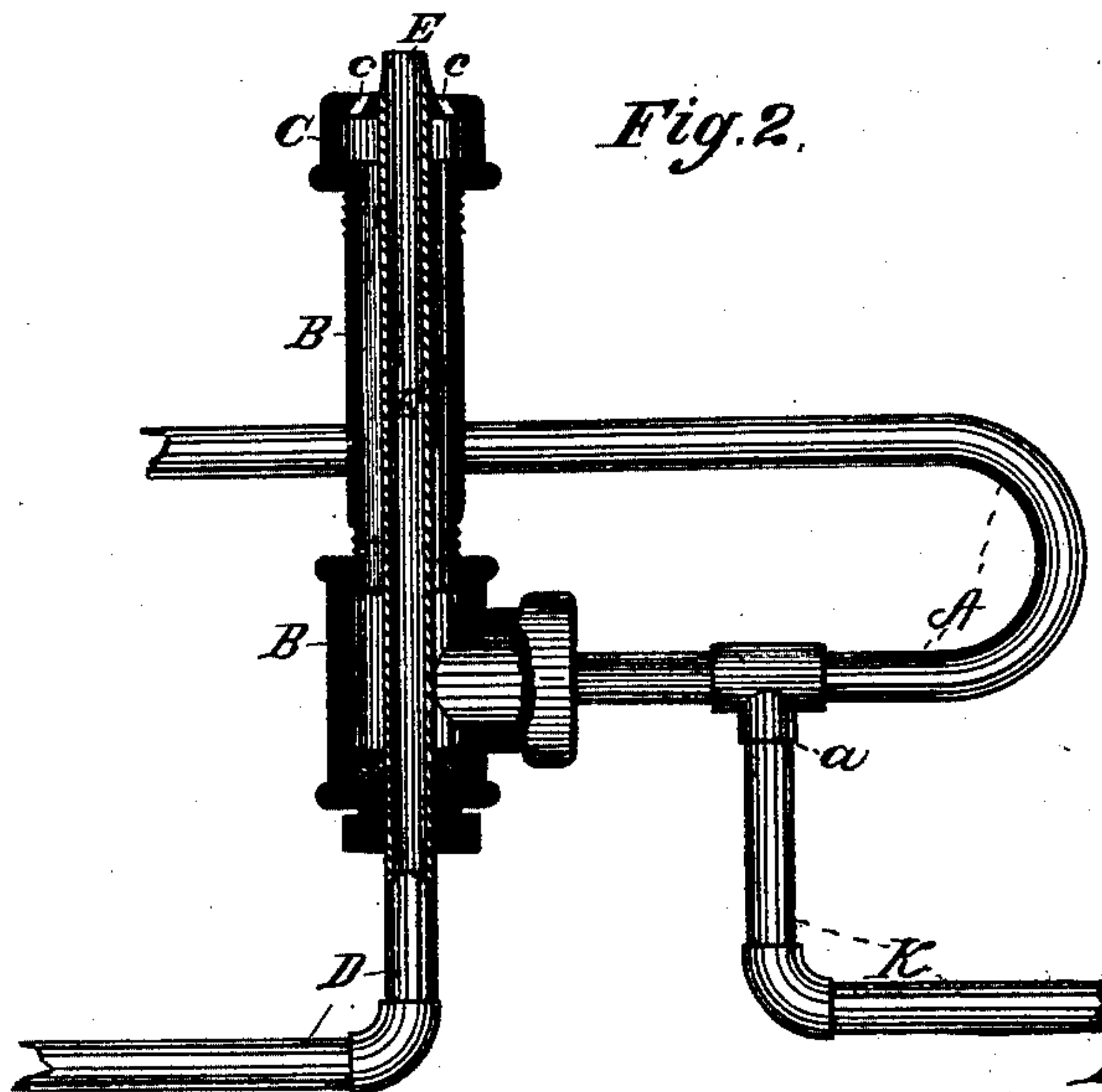


Fig. 2,



Witnesses
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Inventor.
Francis M. Wareham
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UNITED STATES PATENT OFFICE.

FRANCIS M. WAREHAM, OF OIL CITY, PENNSYLVANIA, ASSIGNOR TO
BENJAMIN F. BRUNDRED, OF SAME PLACE.

IMPROVEMENT IN HYDROCARBON-BURNERS.

Specification forming part of Letters Patent No. **223,084**, dated December 30, 1879; application filed
December 4, 1878.

To all whom it may concern:

Be it known that I, FRANCIS M. WAREHAM, of Oil City, in the county of Venango and State of Pennsylvania, have invented certain new and useful Improvements in Hydrocarbon-Burners and devices for operating the same; 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, in which—

Figure 1 is a perspective view of my improved hydrocarbon-burner placed in the fire-box of an ordinary boiler, with a portion of the coil broken away to show the central portion. Fig. 2 shows the burner in section and detached from its coil. Fig. 3 is an enlarged view of part of the burner with its adjustable cap shown in two positions.

My invention consists of improved apparatus for burning the gas evolved from the combination of petroleum and superheated steam as fuel for steam-boilers, glass-houses, blast-furnaces, &c.

It consists of a coil of steam-pipe terminating in the center in a shell or jacket, which is perforated at the top for the escape of steam. The apertures are so arranged that the steam-jets issuing therefrom meet at a common focus, immediately above the pipe placed in the center of the steam-jacket, through which pipe the petroleum flows from a tank or reservoir which is placed at a little elevation above the burner. As the stream of petroleum issues from the burner it is forcibly struck from all sides by the steam-jets and instantly dissipated into vapor, thus affording great contact with the atmosphere and securing complete combustion.

When steam is not needed for any other purpose than to operate the burner, water-tanks are provided, either at such an elevation as to supply the needed pressure, or so arranged as to be operated by the pressure of steam from the coil. The pressure should be about forty pounds to the square inch.

E is the pipe from which the petroleum flows through the pipe D from the tank F. Surrounding E is the shell B, which is connected with the coil A, by means of which steam from the boiler through the pipe N is admitted to said shell B.

At the top of the shell B is the adjustable screw-cap C, which has the perforations *c c* inclined toward the aperture of pipe E. Said cap C is adjustable upon the shell B by means of the screw, so that its top can be adjusted in reference to the aperture of pipe E, and made to approach or recede from it, as desired.

The action of the apparatus after the fire has been started long enough to supply steam in the boiler M is as follows: Petroleum from the tank F flows out of the aperture E. In its passage through E such petroleum is heated by the steam surrounding it in the shell B, so that it is vaporized. Steam from the boiler M, through the pipe N, enters the coil A, and is superheated before it enters the shell B. It then issues with great force from the perforations *c*, and the jets of superheated steam strike the vaporized petroleum, dissipating it in every direction, and, thoroughly mixing it with air, causes it to burn completely and with great intensity.

By arranging the coil A in the furnace I receive great superheating of the steam. By surrounding the petroleum-pipe with the steam-jacket, I heat and vaporize the petroleum, thereby better fitting it for complete combustion, and by arranging the jets so that they will impinge on each other and the escaping stream of petroleum I receive intimate mixture with the atmosphere, and the consequent complete combustion of the petroleum.

In its simplest form my apparatus consists of the steam-pipe N, coil A, shell B, cap C, with apertures *c c*, combined with a petroleum-supply through a pipe, E, passing through said steam-shell B; but in order that it may be capable of starting its own fire with cold water in the boiler M, other devices are necessary.

In the boiler, or connected therewith, I place the drum I, below the water-line, so that

it will be filled with water. On opening the stop-cock *g* the water will flow through the pipe *G* into the coil *A*. Sufficient water should be allowed to flow to partly fill the coil *A*. A small fire of kindling or shavings is put in and around the coil *A*, and when steam issues from the perforations *c c* the petroleum-cock is opened and the oil flows from the burner and is ignited by the fire. The amount of water allowed to run in is regulated by the stop-cock *g*. The pipe *K* allows any water or superfluous steam to be carried back into the drum *I*. When the water in the boiler *M* is sufficiently heated to furnish steam, the cock *g* is closed and the cock in pipe *N* opened, and thereafter steam is taken from the boiler.

After the burner has generated sufficient steam in the boiler, the cocks *g* and *k* are closed and the coil supplied with steam from the dome of the boiler. The fire is then dispensed with around the coil, as the heat from the burner confined in the fire-box of the boiler is sufficient to superheat the steam passing from the dome of the boiler through the superheating-coil *A*.

I claim as my invention—

1. In a hydrocarbon-burner, the combination of a superheating-coil, a central oil-tube, a steam-jacket surrounding such oil-tube, and

an adjustable cap provided with convergent apertures for escape of steam, substantially as shown and described.

2. A hydrocarbon-burner provided with an adjustable perforated steam-cap provided with converging apertures, in combination with a projecting oil-tube, *E*, substantially as shown and described.

3. In a hydrocarbon-burner, a central oil-tube surrounded by a circumscribing steam-jacket provided with steam-jet openings, converging upon the orifice of the oil-tube, in combination with a steam-coil for superheating, as shown and described.

4. In a hydrocarbon-burner, an internal oil-tube, in combination with a circumscribing jacket provided with one or more jet-openings distinct in form from a single annular opening, and converging upon the orifice of the oil-tube, substantially as shown and described.

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

FRANCIS M. WAREHAM.

Witnesses:

JAMES C. BOYCE,
W. R. EDELEN.