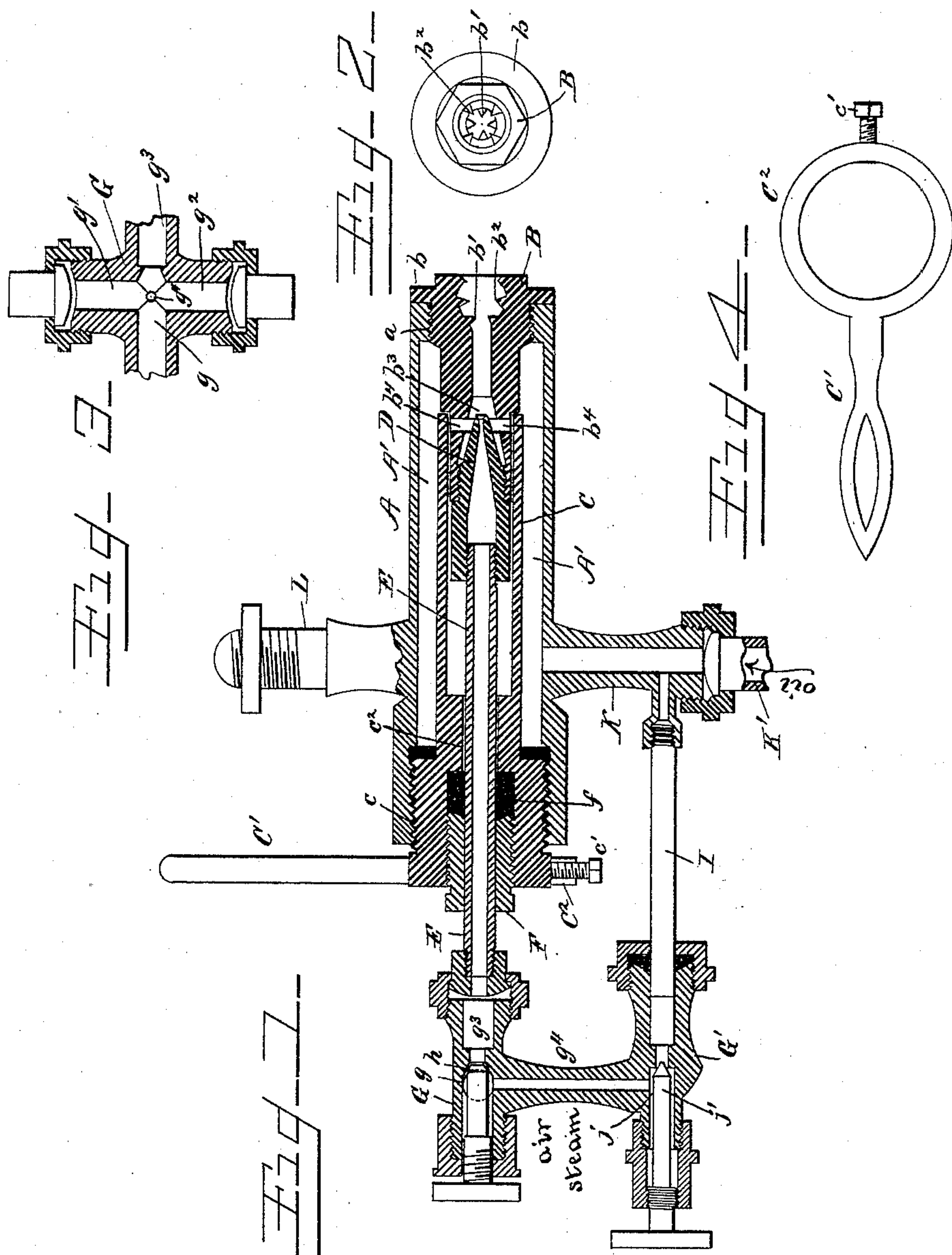


(No Model.)

E. A. RIDER.  
HYDROCARBON BURNER.

No. 436,437.

Patented Sept. 16, 1890.



Witnesses:

Rev. M. Smith  
Chas P. Sweet.

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# UNITED STATES PATENT OFFICE.

EDWIN A. RIDER, OF RACINE, WISCONSIN.

## HYDROCARBON-BURNER.

SPECIFICATION forming part of Letters Patent No. 436,437, dated September 16, 1890.

Application filed December 9, 1889. Serial No. 333,013. (No model.)

*To all whom it may concern:*

Be it known that I, EDWIN A. RIDER, a citizen of the United States, and a resident of Racine, county of Racine, and State of Wisconsin, have invented a new and useful Improvement in Hydrocarbon-Burners for Furnaces, &c., of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making  
10 part of this specification.

My invention relates to a burner for furnaces, &c., employing crude petroleum or other volatile oil as a fuel in connection with steam or air for effecting a vaporization of the  
15 oil, the object being to obtain steadiness of flame and a thorough vaporization and perfect combustion of the oil.

It consists in a novel construction of the burner-cap, mouth-piece, or nozzle; in the arrangement of the steam or air pipe and oil-supply valve in connection therewith; in the arrangement of the steam or air supply pipes, valves, and nozzle for effecting the vaporization of the oil, and in the arrangement of  
25 pipes and valves for cleaning and flushing the oil chambers, ports, and supply pipes, as hereinafter fully described and claimed.

In the accompanying drawings, Figure 1 represents a longitudinal section through my improved burner. Fig. 2 is a plan or end view of the burner-cap or mouth-piece. Fig. 3 represents a section through the T-shaped steam and air connection, taken at right angles to Fig. 1 and showing the steam and air  
35 ports; and Fig. 4 is a plan view of the lever for operating the oil-valve, detached.

A indicates the body or outer shell of the burner, made, preferably, cylindrical in form and internally screw-threaded at its ends at  
40 a, in its outer end, to receive the cap or mouth-piece B, which is screw-threaded on its outer surface to engage the shell, and outside of said screw-threaded part is provided with an annular flange or collar b, which abuts snugly  
45 against the end of the shell. Inside of said screw-threaded portion the mouth-piece B is reduced in external diameter, and the shell A has increased internal diameter given to it to form an annular oil-chamber A' between  
50 the two, and the inner end of the part B is still further reduced in external diameter and enters and snugly fills the adjoining end of

an adjustable sleeve C. The longitudinal central perforation or bore of the cap or mouth-piece B is made flaring or bell-shaped at both  
55 ends, and the outer discharging end has two or more circles of inwardly-projecting points or spurs  $b'$  and  $b^2$ , those of the outer circle  $b^2$  being set opposite the spaces between the points  $b'$  of the inner circle, the object being  
60 to effect a thorough mingling of the particles or atoms of escaping oil and steam or air.

The extreme inner end of the mouth-piece at the end of the inner bell-mouth is cylindrical in form and internally screw-threaded  
65 for a short distance to receive a nozzle D engaging said end, and the point or discharging end of which terminates in a bell-mouth chamber  $b^3$  at that end of the mouth-piece B, as shown.  
70

The reduced inner end of the mouth-piece surrounded by the end of sleeve C is provided with a series of perforations  $b^4$ , forming ports opening into the flaring mouth  $b^3$ , preferably just back of the point of the nozzle D, and through which the oil passes from  
75 the chamber A' into the mouth or mixing-chamber  $b^3$ , regulated in its flow by the end-wise adjustment of the sleeve C, which serves as a valve to open and close the ports or perforations  $b^4$  radiating from said chamber.  
80

The outer or lower end of the sleeve C is enlarged and screw-threaded at c to engage the internally-threaded end of the shell A, and on its end projecting beyond the shell  
85 has a lever C' secured to it through the medium of a ring C<sup>2</sup> on the inner end of said lever surrounding said projecting end of the sleeve, and a set-screw c' passing through the ring and engaging the sleeve for holding the  
90 lever at any desired adjustment.

By operating the lever C' the sleeve C can be adjusted in and out over the adjoining end of the mouth-piece B, and the flow of oil through the ports  $b^4$  regulated, as required,  
95 and where several burners are employed the lever C', for operating the sleeves C, can be connected by link-rods to be operated simultaneously and uniformly.

The nozzle D is funnel-shaped, and is internally screw-threaded at its larger end to receive a pipe E, which passes out through the projecting end of the sleeve C. At one point  
100 c<sup>2</sup> in the internal diameter of said sleeve the



bore is reduced to fit the pipe E snugly, but not so closely as to prevent the movement of the sleeve relatively to the pipe, and outside of said point  $c^2$  the bore is again enlarged to receive a packing  $f$ , and outside thereof a stuffing-box F, screwed into the end of the sleeve and snugly surrounding the pipe E.

The outer end of the pipe E is connected through suitable couplings with a cross or T shaped connection G, provided with a needle or puppet valve  $h$ , by the adjustment of which air or steam, either or both, can be admitted to the pipe E.

The T-shaped connection G is shown in transverse section, Fig. 3, provided on one side with an arm  $g'$ , through which connection is made with a steam-supply, and on the other side with an arm  $g^2$ , through which air under pressure may be supplied, both terminating in a central chamber  $g$ , connecting with the pipe E through an arm  $g^3$ , controlled by the valve  $h$ .

The T-connection G has another lateral arm  $g^4$ , shown arranged in about the same plane with the arms  $g'$  and  $g^2$  and communicating at its inner end with the chamber  $g$  and connected at its outer end with a perpendicular arm or cross-head  $G'$ , connected at one end with a pipe I and provided at its other end with a valve-chamber  $j$ , communicating with the pipe I and controlled by a valve  $j'$  similar to that at  $h$ .

The pipe I connects at its end opposite that connected with the cross-head  $G'$  with an arm or pipe K, connected with the shell A, and through which and a pipe  $K'$ , connected therewith, oil is admitted to the chamber  $A'$  from any suitable supply tank or reservoir.

The couplings for uniting the pipes and valves  $h$  and  $j'$  with the steam and air connections G and  $G'$  and body of the burner may be of the form indicated in the drawings, or any other or preferred form of couplings may be employed.

The operation of the burner will be readily understood. Oil is admitted through the pipe K to the chamber  $A'$ , surrounding the sleeve C, and by adjustment of the latter is admitted through ports  $b^4$  to the mixing-chamber  $b^3$ , surrounding the nozzle D. Air under pressure or steam (or both) is admitted to the nozzle D through the pipe E and T-connection G, controlled by the valve  $h$ , and the cocks admitting the steam or air into said connection, and is blown out through the nozzle D and mouth-piece or cap B, drawing out with it and vaporizing the oil in a manner well understood, and a thorough mixing and mingling of the atoms are effected in their passage by the points or spurs  $b'$  to the outlet and point of combustion, and as a result a steady flame and a regular supply and thorough combustion of the oil are obtained. By closing the valve  $h$  and the cock admitting oil from the tank to the pipe K and chamber  $A'$  and opening the ports  $b^4$  and the valve  $j'$  steam or air may be forced through the pipes

I and K into the chamber  $A'$  and out through the ports  $b^4$  and mouth-piece B for cleaning or flushing the oil pipes, chambers, and outlets, and by closing the ports  $b^4$  and opening the cock controlling the supply-pipe  $K'$  the steam can be forced back through the latter for cleaning said pipe from any gummy or other clogging matter and for warming the oil in the tank, as may be required.

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

1. In a hydrocarbon-burner, the cap or mouth-piece provided with a flaring or bell-shaped mouth having pointed spurs on its flaring inside walls arranged in two or more circular rows, with the spurs in one row set opposite the spaces between the spurs of the adjoining row, substantially as described.

2. The combination, in a hydrocarbon-burner, of the outer shell or casing, the mouth-piece thereto having the flaring mouth and the inner mixing-chamber with its radiating oil-ports, the steam-nozzle entering said chamber, and the adjustable sleeve-valve surrounding said nozzle and mouth-piece for opening and closing said oil-ports and forming the annular oil-chamber between it and said outer shell, substantially as described.

3. The combination, with the outer shell or casing, of the cap or mouth-piece provided with the flaring mouth and the inner mixing-chamber with its oil-ports, the steam pipe and nozzle connected with said mouth-piece and entering said chamber, the sleeve-valve surrounding said pipe and mouth-piece for opening and closing the oil-ports and forming with the outer shell the annular oil-chamber, and means, substantially as described, for adjusting said sleeve.

4. The combination, with the outer shell or casing, of the cap or mouth-piece having the inner mixing-chamber with its oil-ports, the steam and air pipe with its nozzle entering said chamber, the adjustable sleeve surrounding said pipe and the inner end of the mouth-piece, and the T-shaped connection with its valve for admitting steam and air to said pipe, substantially as described.

5. In a hydrocarbon-burner, the outer shell or casing provided with a cap or mouth-piece having the inner mixing-chamber with its radiating oil-ports, in combination with the steam and air pipe connected to said mouth-piece, with its nozzle terminating in said mixing-chamber, and the adjustable sleeve-valve surrounding said pipe and mouth-piece for opening and closing the oil-ports and forming an annular chamber between it and the outer shell, substantially as described.

6. The combination, with a hydrocarbon-burner having the outer shell or casing, the mouth-piece secured thereto and provided with the inner mixing-chamber with its radiating oil-ports, and the adjustable sleeve-valve for opening and closing said ports, of the inclosed pipe connected to said mouth-piece,



with its nozzle entering said mixing-chamber, and the steam and air T-connection with said pipe, also connected with the oil-supply pipe, substantially as and for the purpose described.

- 5 7. The combination, in a hydrocarbon-burner, of the outer shell or casing A, the cap or mouth-piece B, having the inner mixing-chamber with its oil-ports, the steam and air pipe E, with its nozzle, connected to said  
10 mouth-piece and terminating in the mixing-chamber thereof, the sleeve-valve C, surrounding said pipe and mouth-piece and forming

with the outer shell the annular chamber A', the oil-supply pipe K, connected with said chamber A, and the steam and air T-connec- 15  
tion G, connected with said pipes E and K, substantially as described.

In testimony whereof I have hereunto set my hand this 5th day of December, A. D. 1889.

EDWIN A. RIDER.

Witnesses:

WELLS H. PRICHARD,  
JOHN F. BICKEL.