

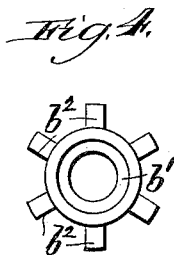
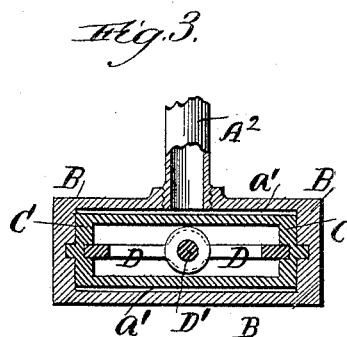
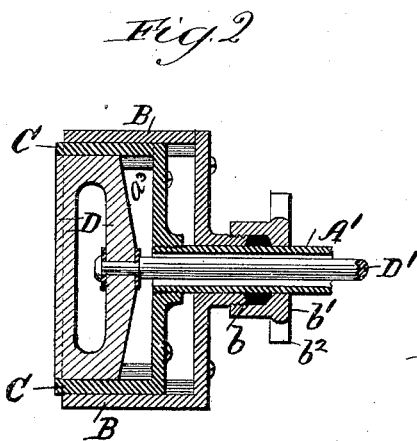
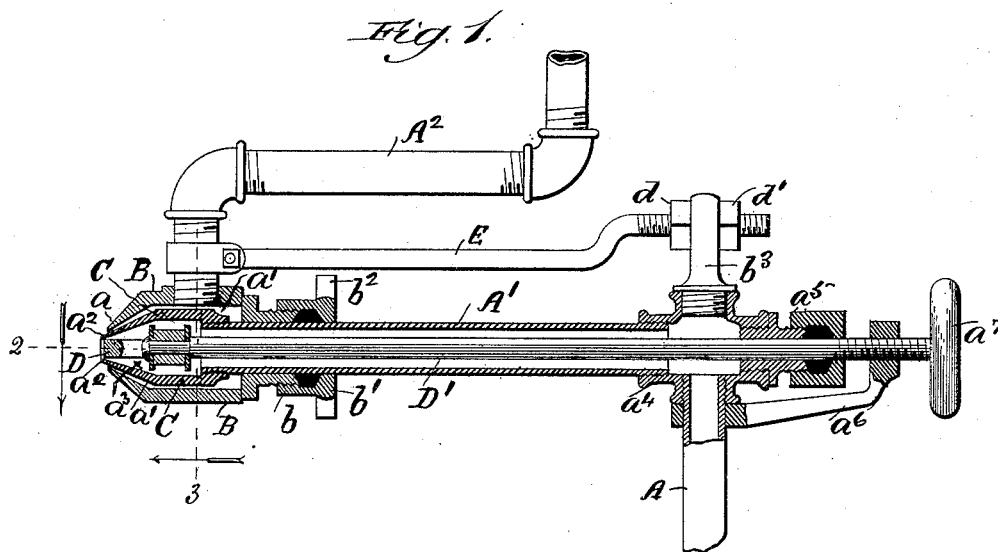
(No Model.)

2 Sheets—Sheet 1.

C. COLE.  
HYDROCARBON INJECTOR BURNER.

No. 423,131.

Patented Mar. 11, 1890.



Witnesses:  
*Chas. E. Gaylord.*  
*L. M. Freeman*

Inventor,  
*Charles Cole.*  
By *L. B. Coupland & Co.*  
*Attys.*

(No Model.)

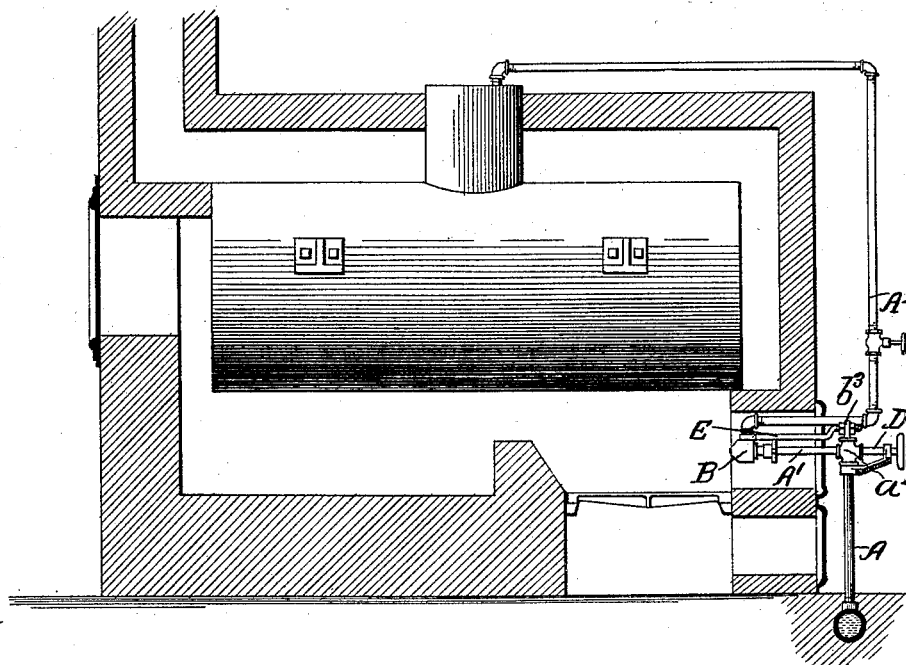
2 Sheets—Sheet 2.

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*Fig. 5.*



*Witnesses:*

*Edw. E. Taylor,*  
*L. M. Freeman.*

*Inventor,*

*Charles Cole.*  
*By L. B. Coupland & Co*  
*Attys*

# UNITED STATES PATENT OFFICE.

CHARLES COLE, OF CHICAGO, ILLINOIS.

## HYDROCARBON INJECTOR BURNER.

SPECIFICATION forming part of Letters Patent No. 423,131, dated March 11, 1890.

Application filed February 21, 1889. Serial No. 300,737. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES COLE, a citizen of Canada, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in a Hydrocarbon Injector Burner, of which the following is a full, clear, and exact description, that will enable others to make and use the same, reference being had to the accompanying drawings, forming a part of this specification.

This invention relates to an improved hydrocarbon-burner; and it consists of a peculiar device for burning petroleum and other oils in the generation of steam, and for the various purposes in which an invention of this character could be used.

The object of this invention is to secure a thorough commingling of the oil and steam, so as to greatly facilitate the process of combustion, the oil and steam being mixed after the former has passed through the burner, the steam being conducted to the mouth of the burner through a separate passage, and so arranged that no matter how small the blaze may be it cannot be extinguished by the action of the steam.

Figure 1 is a side elevation and longitudinal section of a device embodying my improved features; Fig. 2, a horizontal section in plane 2, Fig. 1; Fig. 3, a vertical transverse section in plane 3, Fig. 1; and Fig. 4, a detached detail. Fig. 5 is a longitudinal section and part elevation of a furnace and steam-boiler, showing the relative position of my improved device.

Referring to the drawings, A represents the oil-supply pipe, A' the feed-pipe through which oil is conducted to the burner, and A<sup>2</sup> the steam-supply pipe.

The burner proper consists of the outside steam-nozzle B, the oil-nozzle C, inclosed by the steam-nozzle, and the valve D, located inside of the oil-nozzle. The steam-nozzle is of a flattened rectangular shape, the top and bottom of the front or outer end being contracted to a wedge shape, as shown at *a*, Fig. 1, thereby providing a steam-discharge opening of a rectangular form. The oil-nozzle C is of a form corresponding to and is located inside of the steam-nozzle, leaving the

space *a'* between the two nozzles—that is, above and below the oil-nozzle—and thus providing the steam-exit passage. The steam passes out only above and below and not at the sides, as illustrated in Fig. 3. The contracted or flattened discharge end *a*<sup>2</sup> *a*<sup>2</sup> of the oil-nozzle projects or extends beyond the corresponding companion end of the steam-nozzle, as shown in Fig. 1. By this arrangement the steam-jet strikes the exterior projecting surface and the top and under side of the oil-nozzle at a point back of the oil-exit opening, the force of the steam being checked and at the same time spread into a thin sheet and expanded to more thoroughly unite with the oil-vapors, and results in a more thorough combustion. Another object of this feature—that of the steam being discharged into the furnace just back of the oil—is to prevent the same from interfering with the uniform operation of the oil-supply, and also to prevent the steam from extinguishing the blaze, especially when the flame is reduced to a minimum. The sides of the oil-nozzle bear closely against and have a rabbeted engagement with the inner adjacent sides of the steam-nozzle, as shown in Fig. 3, which feature provides for the adjustment of the oil-nozzle with reference to the steam-nozzle and retains the same in proper relative position thereto.

The flat rectangular regulating-valve D is mounted on the inner end of the valve-spindle D', and is located in the oil-chamber *a*<sup>3</sup> inside of the oil-nozzle. The ends of this valve are rabbeted into the sides of said nozzle, with the front edge seating in the contracted oil-outlet, as shown in Fig. 1, the oil passing out above and below the valve, in a like manner with the steam-supply arrangement.

The valve-spindle D' passes centrally through the oil-feed pipe A', the four-way connection *a*<sup>4</sup>, and the stuffing-box *a*<sup>5</sup>, and has a threaded connection in the supporting-bracket arm *a*<sup>6</sup>. By means of the hand-wheel *a*<sup>7</sup> the valve-spindle may be rotated to diminish or increase the area of the oil-exit opening, as required.

The oil passes from the nozzle in a thin wide sheet, and is therefore more easily vapor-

ized. The inner end of the oil-feed pipe A' has a threaded engagement with the corresponding end of the oil-nozzle, and is provided with the stuffing-box *b*, closing the back  
5 end of the steam-nozzle, which also serves as a slip-joint, so that the steam-nozzle may have a slight movement on said feed-pipe in adjusting said nozzle. The gland-nut *b'* is provided with radial lugs *b<sup>2</sup>* (see Fig. 4) for  
10 the purpose of conveniently adjusting the same.

The steam-supply pipe A<sup>2</sup> is inserted in the upper side of the steam-nozzle. One end of the adjusting-rod E is secured to said pipe at  
15 a point close to the steam-nozzle, the opposite threaded end passing through the post *b<sup>3</sup>*, which in turn is screwed into the four-way connection *a<sup>4</sup>*. On the rod E and on each side of the post *b<sup>3</sup>* are placed the adjusting-  
20 nuts *d d'*, for the purpose of adjusting and locking the steam-nozzle in the position to which it may be adjusted.

The arrangement and relative position of the steam and oil nozzles obviate all danger  
25 from explosions and accidents that have attended the use of a number of oil-burners wherein the flame is liable to be extinguished by the steam, especially when the flame is turned low, and before it was discovered the  
30 furnace filled with a highly-explosive gas which would explode when an attempt was made to relight the burner, thereby causing serious accidents. This cannot occur with the present burner, as the oil and steam enter  
35 through separate passages, the arrangement being such that the steam cannot choke or otherwise prevent a continuous and uni-

form feed through the oil-nozzle. Neither can the oil-passage become clogged, as is the case where the steam and oil both pass through  
40 the same opening.

In operation the burner is first properly arranged in the combustion-chamber and provided with the steam and oil connections. The oil may be fed by gravity or forced by a  
45 pressure-feed. In the first process of lighting a fire of some suitable combustible matter is started around the burner and the oil-valve then slowly opened to start the feed in the form of spray. The steam is then turned  
50 on, and by reason of the wedge-shaped burner injected into the oil-flame from above and below and effects a complete vaporization of the combustible products, a much less volume of steam being required than under the ordi-  
55 nary arrangements.

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

In a liquid-fuel burner, the combination, 60 with the outer nozzle or shell having longitudinal interior grooves and a flattened discharge end, of an inner nozzle of the form of the discharge end of the nozzle of the outer shell, having lateral projections which enter  
65 the said longitudinal grooves; an oil-tube to which said inner nozzle is attached, and means for adjusting said nozzle, substantially as described.

CHARLES COLE.

Witnesses:

L. M. FREEMAN,  
L. B. COUPLAND.