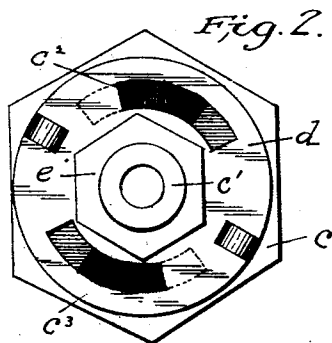
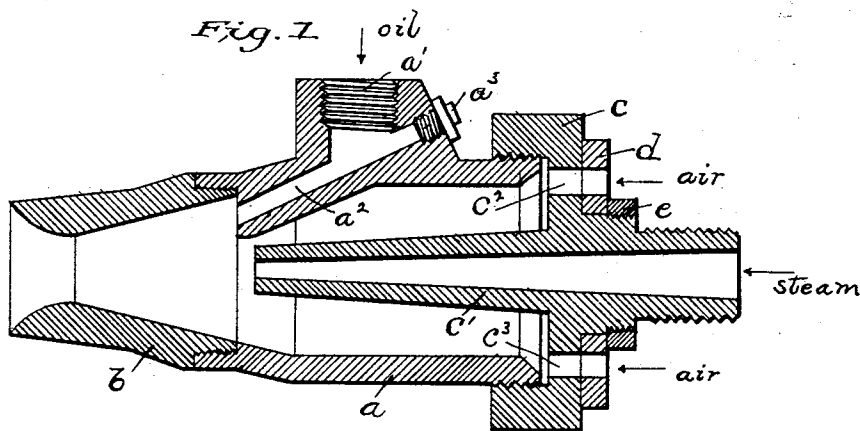


(No Model.)

F. E. KEEFE.
OIL BURNER.

No. 541,168.

Patented June 18, 1895.



Witnesses.

George S. Buell.

W. Clyde Jones.

Inventor.

Frank E. Keefe.

By Barton & Brown Attys.

UNITED STATES PATENT OFFICE.

FRANK E. KEEFE, OF CHICAGO, ILLINOIS, ASSIGNOR OF TWO-THIRDS TO
CHARLES K. MORTON AND FREDERICK W. PARKS, OF SAME PLACE.

OIL-BURNER.

SPECIFICATION forming part of Letters Patent No. 541,168, dated June 18, 1895.

Application filed November 28, 1893, Serial No. 492,230. (No model.)

To all whom it may concern:

Be it known that I, FRANK E. KEEFE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Oil-Burners, (Case No. 1,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to oil burners, and the object thereof is to provide a burner wherein shall be combined durability, cheapness and efficiency of operation, and which may be easily kept in order and readily repaired.

In oil burners of the class to which my invention relates, steam, air, and oil are conducted by separate ducts into a common mixing chamber, provided at one end with a nozzle from which the mixed steam, air and oil emerge. The steam serves to impart velocity to the oil, separating it into a fine spray so that it may more readily and completely combine with the gases of the steam and admitted air; and, further serves to raise the temperature of the mixture. The jet of mixed steam, air and oil thus issuing from the nozzle furnishes an intense flame when ignited, the carbon of the oil uniting combustively with the gases of the steam and air.

My invention contemplates the improvement of burners of the above described class by simplifying the construction thereof, the oil ducts being formed in the walls of the main casting instead of being mounted thereon, while the steam duct and the air ports which are arranged around the steam duct so that the air will be heated in its passage to the flame, are mounted upon a cap adapted to be screwed upon the main casting, the whole construction being thus one of extreme simplicity, with nothing to get out of order and with all parts arranged in the most advantageous positions.

I will describe my invention in connection with the accompanying drawings, in which—

Figure 1 is a sectional view of an oil-burner embodying my invention. Fig. 2 is an end view of such a burner, showing the air-ports partially closed.

Like letters refer to like parts in the several figures.

The burner comprises a main portion *a*, cylindrical in general outline, provided at the top with an opening *a'* which serves as the oil entry, and which may be provided with screw threads to facilitate connection with an oil reservoir. Said opening *a'* communicates with an oblique duct *a²*, the outer end of which is closed by a nut *a³*. The forward end of the casting *a* is provided with properly formed screw threads whereby a nozzle piece *b* may be secured thereto. A cap *c* is adapted to be screwed upon the rear end of said casting, said cap carrying at its center the steam duct *c'* which extends within the casting *a* when the several parts are assembled to a point near the exit end of the oil duct. The bore of the steam duct is convergent toward its exit end whereby the velocity of the steam may be increased. The external end of the steam duct is provided with screw threads, whereby connection may be made in any proper manner with a source of steam supply. Said cap *c* is also provided with air ports *c² c³* preferably formed in arc shape and occupying diametral positions. A valve plate *d* rotatable about a central axis and provided with openings adapted to register with the ports *c² c³* in one position of the valve plate, furnishes a means for regulating the amount of admitted air. The valve plate *d* is preferably mounted to rotate about a portion of the steam duct as a journal, a nut *e* being provided adapted to screw against a collar thereon to maintain the valve plate in position while permitting rotation. The nozzle end of the burner as thus assembled is made convergent whereby the jet may be contracted and its velocity increased, the walls then diverging at the extreme end to permit expansion of the jet, and to prevent the formation of vortices.

It will be understood that valves are provided in the pipes leading to the oil reservoir and steam supply, respectively, whereby the admitted amount of oil and steam may be regulated.

The nozzle is preferably made separable so that its internal convergent surface may be turned up smooth, as when rough eddy cur-

rents are produced in the jet, which impair the action of the burner.

I find the above described arrangement of the oil duct particularly desirable, since any obstacles which may lodge therein may be readily removed by unscrewing the nut a^3 and inserting a wire, or like device, into the duct. Furthermore, the arrangement of oblique oil duct and separable nozzle furnishes a means for accurately placing the opening of the oil duct above the exit of the steam duct, since with the nozzle piece removed the drill with which the oil duct is to be bored, may be started accurately at the proper point.

Having described the constructional features of a burner embodying my invention, I will now explain the operation thereof. The oil and steam valves having been opened to the desired extent, and the valve plate d rotated to present the desired area of air admission, steam emerges from the end of the steam duct passing from the mixing chamber through the nozzle. The suction produced by the flow of the steam draws air through the ports $c^2 c^3$. The air thus admitted into the mixing chamber comes first in heat conductive contact with the walls of the steam duct, its temperature being thereby raised. The column of moving air thus produced encircles the steam duct and upon reaching the exit end of the steam duct mingles with the jet of steam from all sides, a thorough mixture of the steam and air being thus insured. Oil from the oil reservoir passing by the oblique oil duct is directed upon the jet of mixed

steam and air, and being scattered throughout the mixture, issues in connection with the air and steam from the nozzle. The issuing jet comes in contact with the flame and combustion ensues, the carbon of the oil uniting with the carbon of the steam and of the air. The heat of the flame thus continuously fed may be varied by altering the supply of oil, air, or by altering all together.

Many modifications of the above described device will suggest themselves to those skilled in the art, and I do not wish, therefore, to limit myself to constructional details, but

I claim as my invention and desire to secure by Letters Patent—

In an oil burner, the combination with the main casting a , having formed in its upper wall the oblique oil duct a^2 extending through said wall to the exterior thereof, and the oil inlet a' communicating with said oil duct, the removable nut or plug a^3 screwed into the outer end of said oil duct, cap c screwed upon the rear end of said main casting a , said cap carrying a centrally located steam nozzle c' extending into the interior of said casting a , and terminating beneath the outlet end of oil duct a^2 , said cap c being provided with air inlets situated about said steam nozzle, substantially as described.

In witness whereof I hereunto subscribe my name this 24th day of November, A. D. 1893.

FRANK E. KEEFE.

Witnesses:

C. K. MORTON,
W. CLYDE JONES.