

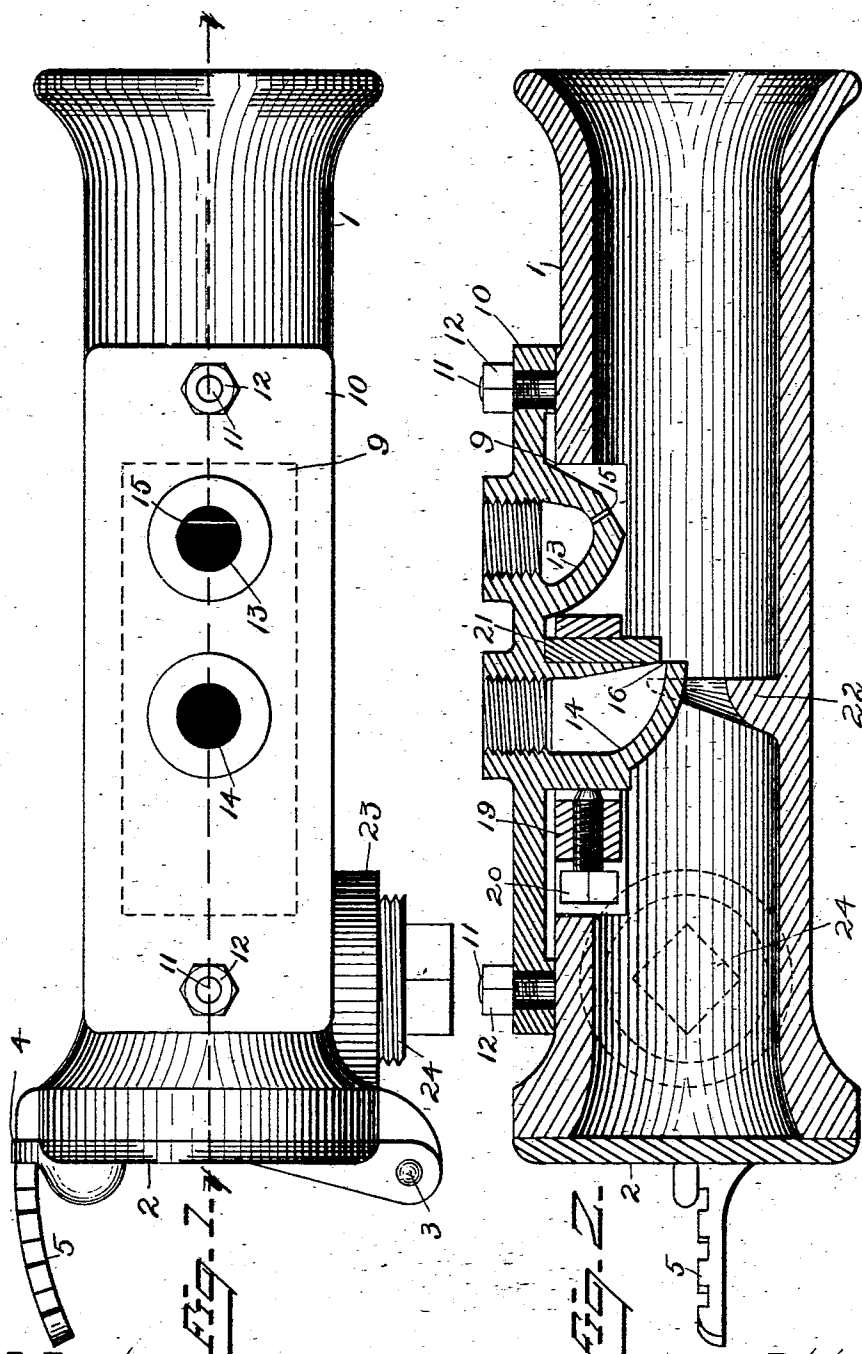
(No Model.)

2 Sheets—Sheet 1.

A. L. GLADWIN.
BURNER FOR LIQUID FUEL.

No. 570,629.

Patented Nov. 3, 1896.



WITNESSES
Charles B. Blocker.
Alfred L. Hayes

INVENTOR.
Albert L. Gladwin,
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attys.

(No Model.)

2 Sheets—Sheet 2.

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Fig. 3.

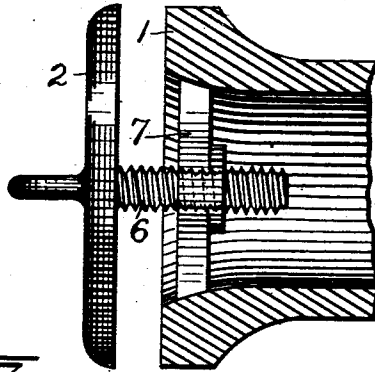


Fig. 4.

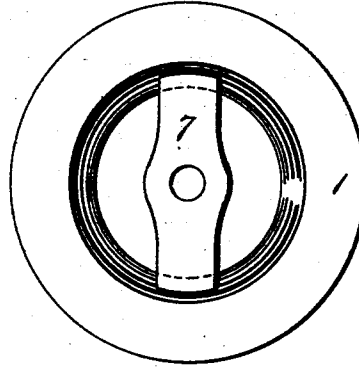


Fig. 5.

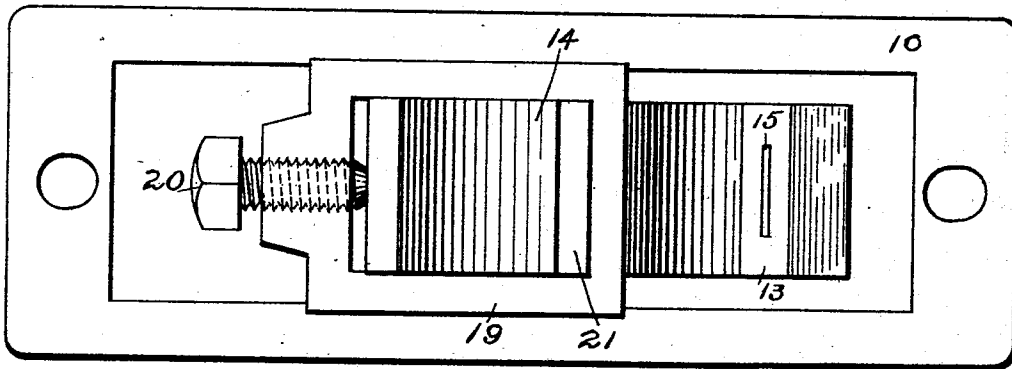
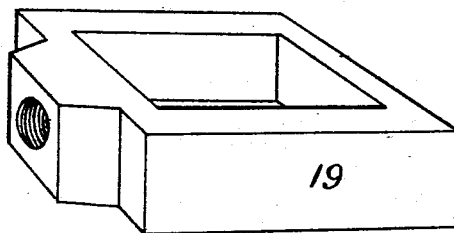


Fig. 6.



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UNITED STATES PATENT OFFICE.

ALBERT L. GLADWIN, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE
ASTOR MANUFACTURING COMPANY, OF SAME PLACE.

BURNER FOR LIQUID FUEL.

SPECIFICATION forming part of Letters Patent No. 570,629, dated November 3, 1896.

Application filed November 12, 1895. Serial No. 568,737. (No model.)

To all whom it may concern:

Be it known that I, ALBERT L. GLADWIN, a citizen of the United States, residing in Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Burners for Liquid Fuel, of which the following, taken in connection with the accompanying drawings, is a specification.

10 This invention relates to that class of burners for the combustion as fuel of petroleum or other liquid hydrocarbon used for fuel, in which burners the oil or other liquid fuel is atomized by a jet of steam impinging upon the liquid fuel as it issues from its supply-
15 pipe and is brought in contact with air flowing through a cylinder inclosing the oil and steam jets; and the object of the invention is to diminish the cost, increase the efficiency, and simplify the construction of the burner;
20 to enable the oil and steam nozzles to be readily removed from the cylinder, thus enabling these nozzles to be kept clean and free from obstructions; to enable the size of the
25 orifice in the steam-nozzle to be increased or diminished at will in such a manner that when any determinate adjustment of the size of the orifice is secured it cannot be altered without first removing the nozzle from the
30 burner.

In the accompanying drawings, Figure 1 is a plan view of the burner. Fig. 2 is a longitudinal sectional view of the same on the dotted line Fig. 1. Fig. 3 is a view, partly in
35 section and partly in elevation, of one form of gate for closing the cylinder. Fig. 4 is an end view of the same. Fig. 5 is a plan view of the nozzles from the under side, and Fig. 6 is an isometrical perspective view of the
40 clamping device for the steam-nozzle.

In the several figures the same numerals refer to the same parts.

Referring to the drawings, 1 is a hollow open cylinder, preferably of cast-iron and
45 generally in practice about two inches in diameter and ten inches in length, though it may be larger or smaller, as may be found convenient, but it should be of sufficient diameter to admit of the expansion to some
50 extent of the jet of atomized oil. The front end of this cylinder is preferably flaring, and

the other end is closed by a gate 2, which can be opened to any desired extent, according to the amount of air which it is necessary to supply for the purpose of insuring the proper
55 combustion of the liquid fuel, and can be fixed in that position.

In Figs. 1 and 2 I have shown the gate 2 as hinged to the cylinder at 3 and provided with a latch 4, which engages with the teeth of
60 the curved ratchet-bar 5 attached to the cylinder 1 and thus enables the gate to be held in any desired position.

In Fig. 3 I have shown the gate 2 as attached to a stem 6, provided with a screw-
65 thread, which stem passes through a bar 7, placed across the end of the cylinder, and is capable of being fixed in any desired position, so as to open the cylinder to any desired extent. This form of gate is preferable to the
70 hinged gate for the reason that it admits air equally around the rear of the burner and that the supply of air can be more closely regulated, but either form of gate may be
75 used.

In one side of the cylinder is an opening 9, preferably of a rectangular form, as shown, but may have any other suitable form. This opening is covered by a plate 10, which extends over the cylinder and beyond the sides
80 of the opening, and is secured to the cylinder by bolts 11 and nuts 12 or by any other means which will permit the easy removal of the plate from the cylinder and secure it tightly and firmly to the cylinder. The un-
85 der side of the plate, excepting where the bolts are inserted, is slightly above the surface of the cylinder, so that a space is formed for a purpose to be hereinafter stated. This plate may be made of any hard metal, but is
90 preferably made of an alloy known as "valve-metal," which is composed of copper and tin and is somewhat similar to bell-metal, and which alloy is used for the reason that it is
95 unaffected by the corrosive action of the liquid hydrocarbon used as fuel, and the alloy which I have invented will be found most
suitable.

13 is the oil-nozzle, and 14 is the steam-noz-
100 zle. These nozzles preferably form part of the plate, but may be made detachable from the same. By forming the plate and nozzles

of a single casting economy in construction is secured. In each of the nozzles is an internal screw-thread for the attachment of the steam and oil supply pipes.

5 The oil-nozzle 13 is in the form of a triangular prism having its parallel sides parallel with the longitudinal axis of the cylinder. The inclined side toward the steam-nozzle is preferably curved, and the other side is truncated at an angle, and the orifice 15 passes through this truncated part at an angle, whereby the oil-jet is projected in the direction of the mouth of the cylinder. This orifice is an elongated slit at right angles to the longitudinal axis of the cylinder. I do not limit myself, however, to orifices or nozzles of the form described, but I find that the best results in the combustion of the fuel are accomplished when these forms are used.

20 The steam-nozzle 14 is behind the oil-nozzle and is quadrilateral and rectangular at its upper part, but its bottom is curved downwardly, and the orifice 16 is formed at the junction of this curved bottom with the straight front side of the nozzle and is longitudinal and at right angles to the longitudinal axis of the cylinder and preferably longer than the orifice of the oil-nozzle. It is also nearer the central longitudinal axis of the cylinder than the orifice of the oil-nozzle, so that the issuing steam will impinge upon the oil as it issues from the oil-nozzle and convert it into a fine spray. The steam-nozzle is not limited to the form described, but this form is found preferable. When this spray is ignited, hydrogen in addition to that obtained by the hydrocarbon will be furnished for combustion by the disassociation of the steam by the heat produced.

40 It is desirable to provide means for increasing or diminishing the size of the orifice in the steam-nozzle and for maintaining this size, so that it cannot be changed without removing the nozzle from the cylinder, thus preventing any variation in the amount of steam supplied while the burner is in use except that due to variation in steam-pressure. Waste of oil or steam is thus prevented and the size of the orifice in the steam-nozzle can be adjusted by the engineer before the burner is set in operation in relation to the available steam-pressure and oil supply, in order to obtain a flame of any desired intensity with the full combustion of the oil. This is an important feature, as it prevents unskilled employees from tampering with the burner while it is in use, in order to secure an increased supply of steam with a consequent increase in the size of the flame. The device used for varying the size of the orifice in the steam-nozzle consists of the rectangular frame 19, surrounding the steam-nozzle and clamped to the same by a set-screw 20, and of the plate 21, movable in the direction of the axis of the nozzle and inserted between the straight side of the nozzle and the end of the frame. This plate can be carried over the orifice 16 to a

greater or less extent and when set can be fixed in position by clamping the frame to the nozzle by the set-screw. The recess on the under side of the plate 10 enables the plate 21 to be moved toward the plate 10. If the nozzle is of any other form than that described and shown in the specification, the frame must be adapted to this form.

On the inside of the cylinder, and preferably opposite to the steam-nozzle, is a ridge 22, having a straight face toward the front of the cylinder and a curved face on the opposite side. This ridge serves to prevent the flow toward the back of the cylinder of the waste and unconsumed oil which may drip from the oil-nozzle.

In the side of the cylinder behind the steam-nozzle is an opening 23, which is closed by a suitable removable plug 24 and through which gas may be introduced into the cylinder.

When the oil issuing from the oil-nozzle and atomized by the steam issuing from the steam-nozzle is ignited, the flame is supplied with air to the desired amount to assure the proper combustion of the oil and to produce the heat desired by opening the gate 2 to such an extent as may be required.

Should the nozzles become clogged, they may be easily removed from the cylinder by detaching the plate 10 from the cylinder, and if it is necessary to clean the cylinder the removal of the nozzles will facilitate this operation. Should either part require renewal, this can be done without affecting the other part.

All the parts are easily constructed by casting and are readily separated from one another, but when united form a burner which has been found by experiment is well adapted to secure the proper combustion of liquid fluids.

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

1. In a burner for the combustion as fuel of petroleum or other liquid hydrocarbons used for fuel, the combination substantially as described, of a hollow open cylinder; having an opening in the side of the cylinder to provide access to the interior thereof; a plate covering this opening and removably attached to the cylinder, and nozzles for the respective supply of steam and oil, or other liquid hydrocarbon used as fuel, attached to the under side of the plate and projecting into the cylinder.

2. In a burner for the combustion as fuel of petroleum or other liquid hydrocarbon used for fuel, the combination substantially as described, of a hollow open cylinder; having an opening in the side of the same to provide access to the interior of the cylinder; a plate covering this opening and removably attached to the cylinder; a nozzle for the supply of oil, or other liquid hydrocarbon used as fuel, attached to the under side of the plate

and projecting into the cylinder; a nozzle for the supply of steam, attached to the under side of the plate and projecting into the cylinder and having its orifice directed toward the front part of the cylinder and nearer the central longitudinal axis of the same than the orifice of the oil-nozzle, and the longitudinal orifices in the nozzles at right angles to the axis of the cylinder.

3. In a burner for the combustion as fuel of petroleum or other liquid hydrocarbon used for fuel, the combination substantially as described, of a hollow open cylinder; having a rectangular and oblong opening in the side of the same to provide access to the interior of the cylinder; a rectangular and oblong plate covering this opening and removably attached to the cylinder; a nozzle for the supply of steam, attached to the under side of this plate and projecting into the cylinder and of rectangular form in its upper part within the cylinder and curved at its bottom toward its orifice; said nozzle having a longitudinal orifice opening toward the front of the cylinder and at right angles to the axis of the cylinder; a nozzle for the supply of oil, or other liquid hydrocarbon used as fuel, attached to the plate and projecting into the cylinder to a less extent than the steam-nozzle, said nozzle being in the form of a prism, having its parallel sides parallel with the axis of the cylinder, its side toward the front of the cylinder truncated, and an orifice formed by a longitudinal slit in the truncated face at right angles to the axis of the cylinder and inclined toward the front of the cylinder.

4. In a burner for the combustion as fuel of petroleum or other liquid hydrocarbon used as fuel, the combination substantially as described, of a hollow open cylinder; having an opening in the side of the same; a plate covering the opening and removably attached to the cylinder, and nozzles for the supply of oil and steam, cast or otherwise formed in the same piece with the plate.

5. In a burner for the combustion as fuel of petroleum or other liquid hydrocarbon used as fuel, the combination, substantially as described, of a hollow open cylinder; having an opening in the side of the same; a plate covering the opening and removably attached to the cylinder; nozzles for the supply of oil and steam attached to the under side of the plate and means within the cylinder for regulating the size of the orifice in the steam-nozzle.

6. The combination substantially as described, of the covering-plate recessed upon its under side; the steam-nozzle attached to the plate; an orifice opening under the front side of the nozzle; a frame encircling the nozzle; an adjustable plate bearing against the front side of the nozzle and placed between the frame and this front side, and the set-screw for clamping the frame to the nozzle.

In testimony whereof I have hereunto subscribed my name this 11th day of November, A. D. 1895.

ALBERT L. GLADWIN.

Witnesses:

CHAS. A. KELLOGG,
ALEX. L. HAYES.