Aug. 24, 1926. 1,597,386

C. A. NORALL

BURNER

Filed Oct. 5, 1925

Fig. 1.

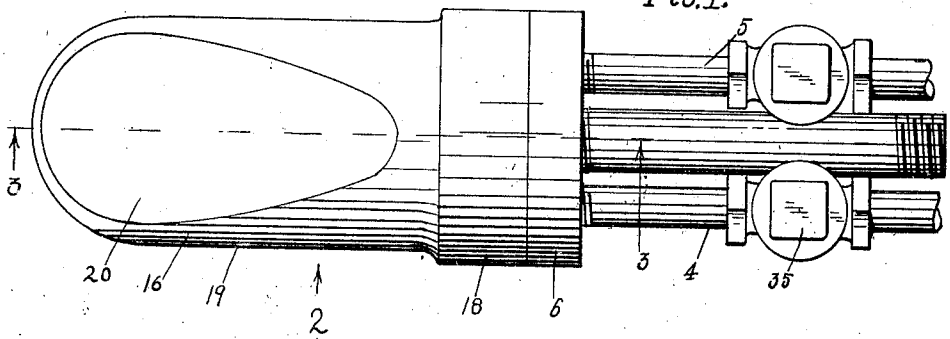


Fig. 2.

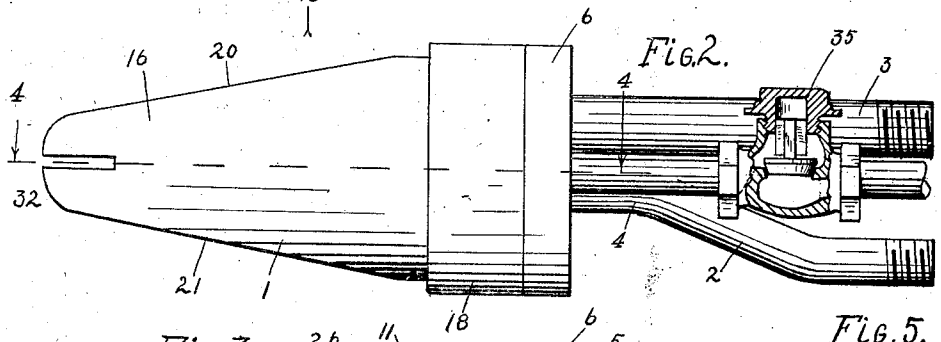


Fig. 3.

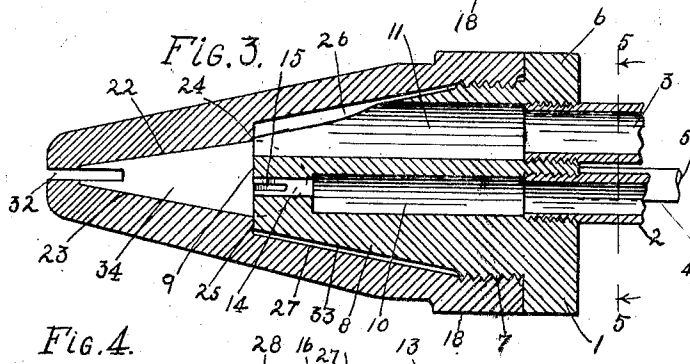


Fig. 5.

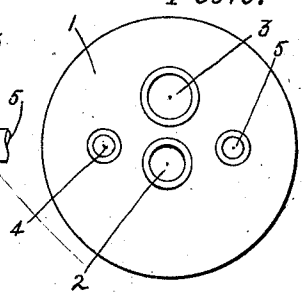


Fig. 4.

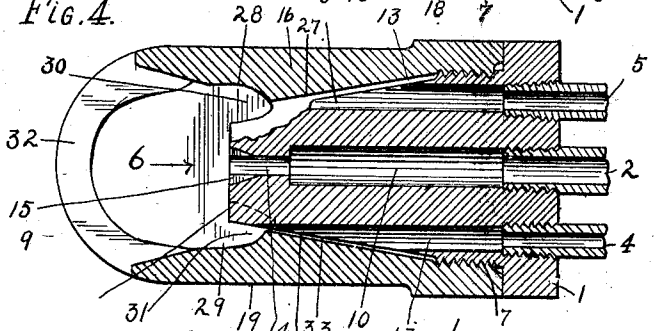


Fig. 8.

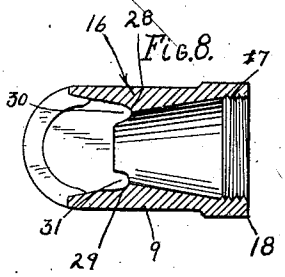
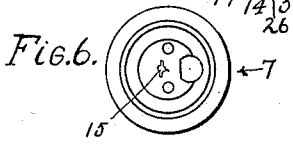


Fig. 6.



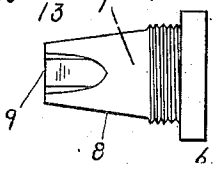


Fig. 7.

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UNITED STATES PATENT OFFICE.

CARL A. NORALL, OF LOS ANGELES, CALIFORNIA.

BURNER.

Application filed October 5, 1925. Serial No. 60,641.

My invention is an oil burner of the steam injection type, in which a jet of steam atomizes and spreads the oil and sucks the air into the burner forming a mixture of oil, air and steam.

An object of my invention is to provide an oil burner in which the oil outlet is positioned above the steam jet and with the air inlets laterally positioned relative to the steam jet and slightly below the oil inlet, to obtain an improved mixing of the oil, air and steam. Another feature of my invention is the construction of a flattened mixing chamber in the mixing nozzle, having a horizontal orifice in the form of a slot giving a horizontal spread to the fuel. Another feature of my nozzle and burner construction is the provision of an air space between the inlet nozzles and the body of the outlet nozzle, whereby a circulation of air may be established when the burner is shut off, thus cooling the burner of the heat radiated from the furnace walls.

My invention will be more readily understood from the following description taken together with the drawings in which:—

Figure 1 is a plan view of my burner, showing the flattened construction of the outlet nozzle and the oil and air feed pipes.

Figure 2 is a side elevation taken in the direction of the arrow 2 of Figure 1.

Figure 3 is a vertical longitudinal section on the line 3—3 of Figure 1 in the direction of the arrows.

Figure 4 is a horizontal section on the line 4—4 of Figure 2 in the direction of the arrows.

Figure 5 is a vertical transverse section on the line 5—5 of Figure 3 in the direction of the arrows.

Figure 6 is a front or end view of the inlet nozzles taken in the direction of the arrow 6 of Figure 4.

Figure 7 is a plan view of the inlet nozzles taken in the direction of the arrow 7 of Figure 6.

Figure 8 is a detail horizontal section of the mixing nozzle, with the inlet nozzle removed, as if taken on the line 4—4 of Figure 2.

In the drawings the burner fuel inlet nozzles are contained in the inlet nozzle body 1 having a central steam inlet pipe 2, an oil pipe 3 directly above the steam pipe and two lateral air pipes 4 and 5 screwthreaded into the inlet nozzle body. This nozzle body has a flange 6 at its rearward end a parallel threaded section 7, a tapered section 8 and a squared nose 9. A central duct 10 conducts the steam, an upper duct 11 the oil and the lateral ducts 12 and 13 conduct the oil and air from the feed pipes through the inlet nozzle body.

The steam nozzle 14 is contracted in size from the bore of the steam duct 10 and has two opposite kerfs 15 giving the steam a horizontal spread.

The mixing nozzle 16 has a cylindrical section 17 with a screwthreaded portion 18 fitting the threads 7 and is contracted with substantially parallel sides 19 and tapered top and bottom surfaces 20 and 21. On the interior the mixing nozzle has a tapered top and bottom mixing section 22 and 23 with a top and bottom step 24 and 25 slightly forward of the middle of the nozzle, continuing in tapered surfaces 26 and 27 to the screwthreaded portion 18. At the sides the inside of the mixing nozzle is substantially parallel as indicated by the numerals 28 and 29. Reverse curves 30 and 31 are therefore made where the tapered and parallel surfaces meet back of the steps 24 and 25. The orifice 32 follows around the end of the nozzle and is a narrow slit adapted to spread the fuel in a thin horizontal spray.

When the inlet nozzle and the mixing nozzle are fitted together a space 33 separates the tapered portions back of the steps and the nose 9 of the inlet nozzle fits tight against the steps. A recess is made in the upper surface of the inlet nozzle where the oil duct 11 joins the surface 26 to allow free flow of the oil: and on account of the shape of the meeting surfaces the air streams from the air ducts 12 and 13 are converged slightly inward. A mixing chamber 34, in the space forward of the steps mixes the oil and air projected by the steam. The steam jet is so located in the jet nozzle that it impinges on the bottom 22 of the mixing nozzle and is deflected slightly upward thus scouring the bottom and top of the mixing chamber 34 and keeping the orifice 32 clean.

The air inlet pipes are provided with check valves 35, which are proportioned in weight to respond to the variations of steam pressure, causing jets of different velocities and to maintain a check on the flow of air.

The manner of functioning of my oil burner is substantially as follows:—When the steam is turned on, with the oil and air

pipes open, oil and air are drawn into the burner by the suction developed by the steam jet. The flow is proportionate to the velocity of the steam. The steam jet is spread out horizontally by the shape of the mixing nozzle and carries the oil on the upper surface of the steam jet until the oil and steam are mixed and incorporated with the air. When in operation the steam and air jets keep the burner cool, but when the jets are shut off the burner is subject to the heat radiated from the interior of the furnace, which heats the burner to a higher temperature than when in use. The air space 33, the recess above the oil inlet duct 11 and the space at the outer ends of the air ducts form air circulating spaces and passages aiding the cooling of the burner.

My burner may be considerably modified to suit particular oil burning installations and may be altered in design without departing from the spirit thereof as set forth in the specification, drawings and claims.

Having described my invention what I claim is:—

1. An oil burner comprising in combination a unitary inlet nozzle having an axially central steam duct, an oil duct thereabove, and substantially parallel thereto, two opposite laterally positioned air ducts parallel to the steam duct, a mixing nozzle mounted on and surrounding said inlet nozzle having a mixing chamber therein, forward of the inlet nozzle, tapered on its top and bottom surfaces and having substantially parallel sides, and means to secure the inlet nozzle and mixing nozzle together.

2. An oil burner comprising in combination an inlet nozzle shaped substantially as a frustrum of a cone with the small end forming an abutment nose, said nozzle having passages therethrough in an axial direction for oil steam and air, a mixing nozzle tapered on its inner surface on the top and bottom mounted on and surrounding the inlet nozzle and abutting against the abutment nose, a mixing chamber forward of such nose, and an orifice therefor in the form of a slot.

3. An oil burner as claimed in claim 2 in which the passages for oil, steam and air comprise a central steam duct, an oil duct thereabove and a pair of air ducts on the side of the steam duct.

4. An oil burner comprising in combination an inlet nozzle shaped substantially as a frustrum of a cone with the small end forming an abutment nose, said nozzle having ducts therethrough for oil, steam and air, a mixing nozzle having a step in its top and bottom surfaces engaging the nose of the inlet nozzle, tapered top and bottom surfaces continuing adjacent the coned portion of the inlet nozzle but slightly spaced therefrom, and forwardly extending tapered top and bottom surfaces from the said steps and having a slot shaped orifice curved forwardly in substantially a semicircle.

5. An oil burner as claimed in claim 4 in which the steam duct is situated in a central position slightly below the center, the air ducts are situated on opposite sides of the steam duct and discharge into the space between the inlet nozzle and the mixing nozzle and the oil duct is situated above the steam duct and discharges into the space between the inlet nozzle and the tapered top surface of the mixing nozzle extending backwardly from the said step.

In testimony whereof I have signed my name to this specification.

CARL A. NORALL.