Apr. 24, 1923.

1,452,559

J. C. JOHNSON

OIL BURNER CONSTRUCTION

Filed March 23, 1922

2 Sheets-Sheet 1

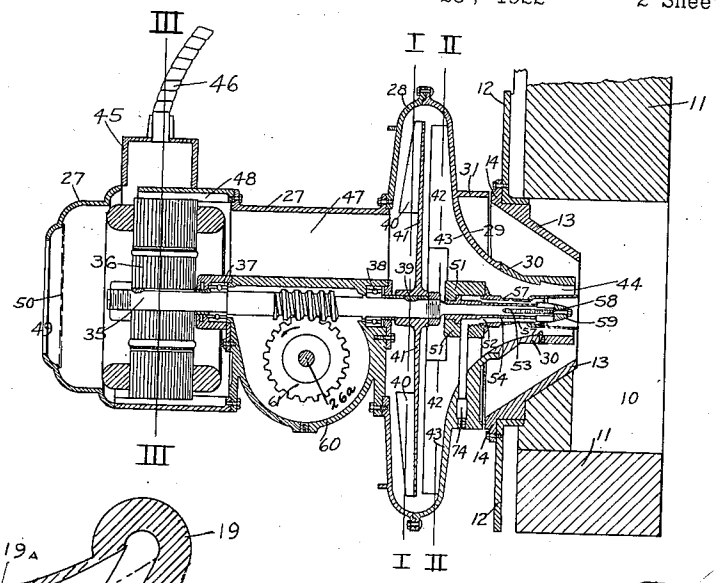

Fig. 1

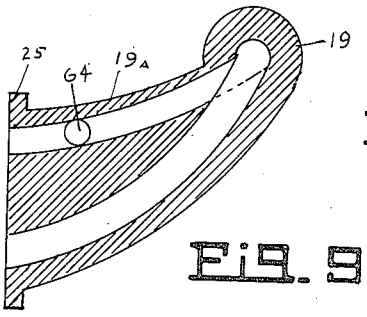

Fig. 9

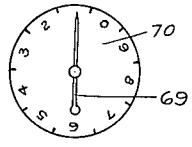

Fig. 8

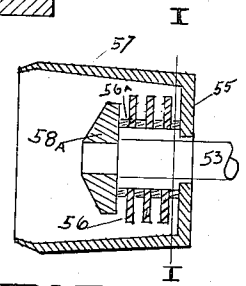

Fig. 10

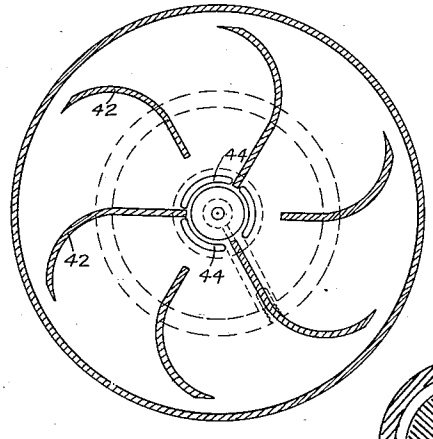

Fig. 2

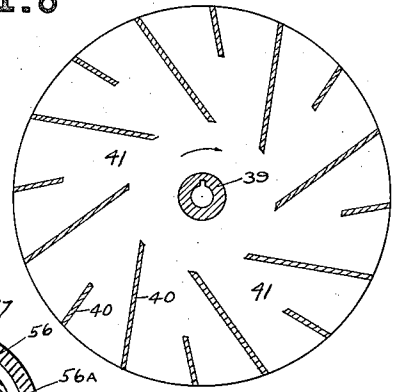

Fig. 3

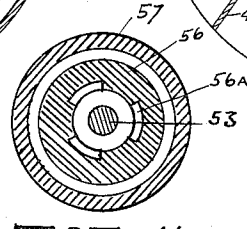

Fig. 11

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OIL BURNER CONSTRUCTION

Filed March 23, 1922 2 Sheets-Sheet 2

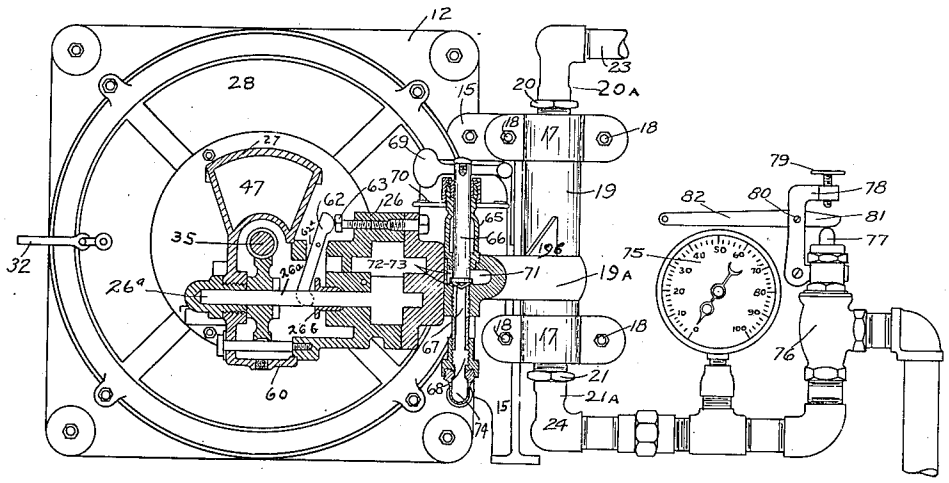

Fig. 4

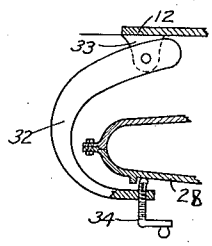

Fig. 7

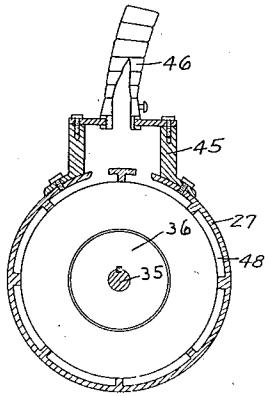

Fig. 5

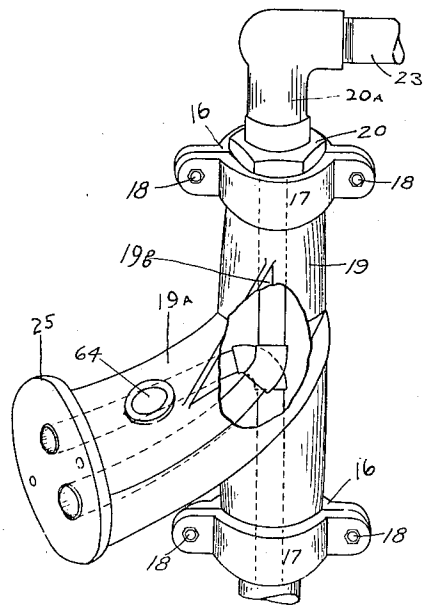

Fig. 6

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Patented Apr. 24, 1923. 1,452,559

UNITED STATES PATENT OFFICE.

JESSE C. JOHNSON, OF SAN FRANCISCO, CALIFORNIA.

OIL-BURNER CONSTRUCTION.

Application filed March 23, 1922. Serial No. 545,989.

To all whom it may concern:

Be it known that I, JESSE CLAUDE JOHNSON, a citizen of the United States, residing at 1337 Mission Street, San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Oil-Burner Constructions, of which the following is a specification.

The present invention relates to certain improvements in crude oil burner construction and is more particularly an improvement in the general class described and set forth in United States Letters Patent No. 1,201,999 granted to me October 17, 1916; and Letters Patent granted to Seward T. Johnson, January 30, 1905, and November 21, 1911, Nos. 781,284, and 1,009,525 respectively, and owned by me.

It is the object of the present invention to provide a crude oil burner construction of the type disclosed in the said patents, which shall embody certain improvements to better adapt it for the purposes intended.

The particular features of this invention consists in certain mechanical formations of the liquid fuel oil burner, the oil supply connections therefor, and of means providing superior advantages in point of accessibility and general efficiency by suspending the whole burner unit on a pedestal near the furnace door capable of swinging relatively thereto.

The present device contemplates the arrangement within a hollow burner casing of a motor, the shaft of the latter operating a rotary pump and a set of fan blades within the said casing, as well as revolving an atomizer positioned at the mouth of the burner casing.

Another object of this invention is to provide an arrangement in which the air supply to the fan blades is effectively utilized in the operation of cooling the working parts of the motor, and the air, thus pre-heated, facilitating a more perfect atomizing of the combustion fluid.

Another important object of the present invention is to provide a burner with a novel form of fuel control means, the same operating in a manner to reduce the flow of fuel oil to the burner head automatically, said means being controlled by the temperature of the water, or other medium heated by the burner.

This invention possesses other advantageous features, which, with the foregoing will be set forth at length in the following description, where I shall outline in full that form of my invention which I have selected for illustration in the drawings accompanying and forming part of the present specification.

Referring to said drawings, in which like designating characters refer to corresponding parts throughout the several views:

Figure 1, is a central longitudinal sectional view through the device and the position of the fire-box indicated;

Fig. 2, is a vertical plan view of the stationary fan blades upon line II—II of Fig. 1;

Fig. 3, is a vertical plan view of the revolving fan blades upon line I—I of Fig. 1;

Fig. 4, is a front view of the burner and the oil supply connections without the motor and partly in section;

Fig. 5, is a cross sectional view of the motor upon line III—III of Fig. 1;

Fig. 6, is a perspective view of the manifold of the burner with the burner and its coupling omitted;

Fig. 7, is a plan view of the latch showing its mode of operation in relation to the burner casing;

Fig. 8, is a plan view of the dial of the oil supply regulating valve;

Fig. 9, is a horizontal plan view of the curved arm of the manifold;

Fig. 10, is a sectional enlarged view of the atomizer; and

Fig. 11 is a cross sectional view of the atomizer upon line I—I of Fig. 10.

While the present device is employable wherever a burner is desired, the same is especially adapted for furnace use and is herein illustrated in connection with a fire-box 10, formed of brick work 11 and having a protecting plate 12, having an opening formed therein provided with an exchangeable portion 13 of frusto-conical form, projecting within the fire-box and having a flange 14.

Formed integral with the plate 12, or otherwise secured thereto is a pedestal bracket 15, provided with journal bearings, comprising the pillow 16, and the cap 17, having screws 18, with set nuts for adjustment, as shown on Figs. 4 and 6 respectively.

Journaled within the said bearings is a manifold, comprising a tubular centrally divided vertical standard portion 19, hav-

ing a horizontally disposed centrally positioned curved, or quarter bend twin tubular arm portion 19a, integral therewith and flanged as at 25. The twin tubes of the said arm portion 19a of the manifold diverge at their points of meeting the vertical standard portion 19, of the manifold, one of the tubes ascending, and the other tube descending within the vertical standard portion of the manifold.

Hollow pintle members 20a and 21a, the inner ends of which are connected with the upper and lower ends of the manifold by packing glands 20 and 21, provide rotatable swivel connections through a pipe 23, with any suitable oil supply, and through a pipe 24, for a return flow of excess oil, thus forming two distinct and independently acting tubular connections for an oil supply, and for an excess oil return flow to, and from a pumping system 26, respectively, and adapted to swing laterally in substantially a horizontal plane.

The two tubular terminals at the flange 25, of the manifold arm being in alinement with their respective ports of the pump 26.

The said manifold standard and its arm portion preferably constitute a single casting, reinforced by a web as at 19b, to secure the rigidity necessary for the different purposes for which it is intended.

The flanged end of the manifold arm, and a pump of suitable construction, are connected together by bolts passing through their flanges at their meeting ends.

Referring to Fig. 1, the hollow burner casing 27, which is substantially circular in cross section, somewhat enlarged in cross sectional area near its rear end as at 28, is at the rear extremity or discharge end thereof constricted, forming a tapered mouth portion 29, ending into an annular air nozzle 30. The said casing may be of any suitable construction, and in the form shown is composed of several sections suitably connected together by bolts passing through lugs at their meeting ends.

Formed integral with the tapered mouth portion 29 of the casing, is an annular lug 31, shaped to meet and set against the outer flange 14, of the frusto-conical portion 13. To secure the position of the said lug 31, of the motor casing to the fire-box plate 12, a latch bar 32, pivoted to the fire plate 12, as at 33, having a suitable milled set screw 34, for adjustment is provided as shown on Fig. 7.

As shown on Fig. 1, the propelling shaft 35, of the motor 36, projecting inwardly of the casing 27, is centrally journaled within the said casing and supported therein by means of ball bearings 37 and 38, the outer end of the shaft being extended as shown, having the axle 39, of the fan blades 40, attached thereto. The fan blades 40 are connected to the axle 39, by means of a disk 41, such blades being provided in any suitable number, while the blades may be formed of slight curvature if found desirable.

Stationary blades 41, are secured to the inner side of the casing as at 43, being designed to direct the air properly into the annular air outlet passage 44, and to prevent any rotary movement of the air.

A novel feature of the present improvement is the mounting and construction of the burner inclosing casing part.

Referring to Fig. 1, it will be seen that the burner casing covering the motor consists of two parts. One of the said parts forming a suitable cover 45 for the motor terminals, having a flexible conduit 46, carrying the usual electric wires from a source of electricity, not here shown, is secured by bolts or in any suitable manner to the motor casing part 27, which is secured to the air duct extension 47 by suitable means.

This casing part 27, enveloping the motor, being to some extent larger than the circumference of the motor, is suitably spaced therefrom, forming channels 48, around the said motor, an air intake opening 49, is provided in the said casing, the air being admitted through a screen 50 to prevent injury to the motor by dust entering through the said opening.

These channels are provided for the double purpose of effecting the cooling of the motor, when running, and of pre-heating the air supply passing through the air duct 47, to the fan blades.

An oil dispenser 51, in the form of a sleeve and having an oil chamber 52 therein, is secured within the central opening of the air discharge passage 44.

The outer end portion of the shaft 35, is reduced as at 53, upon which is secured a sleeve 54, terminating in an atomizing plate 55, outwardly of the free ends of the oil dispenser.

A plurality of metallic plates 56, are dependently carried by the inner plate 55, being secured thereto by spacings 56a, being preferably arranged between the said plates.

The outer wall of the oil dispenser 51 is drawn inwardly and flanged at its outer end as at 57, for the purpose of contracting the outlet opening of such dispenser while the inner wall thereof is of greater length than the outer wall and is reduced as at 57a, the comparative narrow outlet of the dispenser 51, being thereby positioned beneath the said atomizing plates 55 and 56 respectively.

The inner atomizing plate 55, having a somewhat enlarged cross sectional area relatively to the adjoining atomizing plates is provided with a forwardly projecting annular flange 57, surrounding and extending beyond the atomizing plates 56, whereby, when the atomizer is revolved at a great

speed, the fuel oil is atomized and sprayed out into the fire-box in a plurality of lines or streams extending radially toward the air discharge passage and laterally toward its open end.

A securing bolt 58, extends inwardly axially of the axle 35, and is provided with a washer 58ª, overlying the outer plate of the atomizer, the said bolt terminating in a head 59, whereby the bolt may be properly positioned, it being understood that the latter is preferably threaded into the said axle.

The pump 26, being supported with relation to the propelling shaft 35, by means of a bracket like casing part 60, and is bolted at right angles to the burner casing 27, being directly driven from the propelling shaft at reduced speed by means of a worm gear drive generally indicated as at 61.

From the foregoing it will be apparent, that by these novel features of construction of this burner arrangement, the burner may be swung to, or away from the furnace opening, as the whole unit is carried by the manifold 19, rotatably mounted to the pedestal bracket 15, without disturbing the oil supply or its connections.

Another novel feature of this burner construction as shown on Fig. 4, is a possibility of taking up on the packing of the pump. Pivotally connected to the pump casing 26, is a sliding latch bar 62, the lower end of the said bar riding on the pump shaft 26ª, adjacent to and in operative position to the pump shaft packing 26ᵇ, to stop a leak of oil at this point, the other end of the said bar extending upward through an opening 62ª, provided in the casing 26 and exterior thereof, the tightening up of the pump packing can be done while the burner is in operation, by manual adjustment of the said latch bar by means of a threaded bolt 63, positioned exterior of the said casing.

The arm of the manifold is provided with a boss 64, carrying an oil regulating valve 65, the stem 66 of this valve having a central bore 67, with an open end 68, the said valve stem being capable of a turning movement within its casing by manual adjustment of the pointer 69, moving over a graduated dial 70. A chamber 71, formed at the side of the valve case 65, communicates through the ports 72 and 73 with the bore 67 of the stem 66. An oil pipe 74, is connected to the open end 68 of the valve stem 66. The chamber 71 is located within the return flow conduit pipe 24, a graduated pressure gage, generally indicated as at 75, having an indicator, showing the existing oil pressure within the said return flow conduit, is suitably mounted therein.

The oil from the pumping system enters the chamber 71 before it enters through the ports 72 and 73 to the pipe 74 and the oil burner connected therewith. A nearly constant oil pressure is maintained by the pumping system within the said return flow conduit, and the oil supply from this conduit to the burner is adjusted by the regulating valve 65, a control valve 76, having a stem 77, is positioned adjacent the pressure gage 75 and being operated by the oil pressure maintained by the pumping system within the return flow conduit.

Secured to the upper part of the casing of the valve 76, is a yoke 78, carrying a set screw 79 for adjustment.

Pivotally connected to this yoke as at 80, is a lever, seating its short arm 81 upon the valve stem 77. A steam pressure regulator, on top of the boiler, not shown in these drawings, is connected by suitable means with the long arm 82 of the said lever. The steam within the boiler, on reaching a certain pressure will open the regulator, thus also lowering the lever arm 82 connected with it. The downward movement of the arm 82, causing the short arm 81, to release in an upwardly direction the valve stem 77, thus enlarging the passage chamber of the said valve and permitting of a larger quantity of fuel oil to pass through the return flow pipe 24 to its source.

Thus it will be seen, by the release of this valve in this manner, the pressure of oil within the chamber adjacent the regulating valve 65, is thus automatically relieved, reducing the oil supply to the atomizer of the burner, by allowing more oil to return through the return flow pipe, and incidently reducing the fire underneath the boiler.

The complete operation of the device will be apparent from the present detailed description thereof; it being understood that when the burner is desired for use, the motor 36, is started in operation, the turning of the motor shaft 35, effecting revolving of the rotary pump system, of the fan blades as well as the atomizer, while oil is conducted into the oil chamber 52 through the pipe 74, the oil being reduced to a fine spray as it leaves the oil dispenser 51, being deposited within the atomizer. The atomizer, when revolving at a high speed, causes the oil to be discharged by centrifugal force through the spaces separating the atomizing plates 55 and 56. Simultaneously with the discharge of fuel oil from the atomizer, occurs a flow of air from the fan blades 40, further atomizing the fuel oil and throwing the same forward into the fire-box, there readily bursting into flame when ignited. The air intake being directed around the motor by channels 48, before entering the air duct 47, to supply the fan blades, provides for a continuous air cooling of the motor when in operation, and the air supply thus pre-heated, materially facilitates a perfect atomizing of the fuel oil.

The pumping system is directly connected

with the motor and provides for a constant oil supply under pressure within the conduit 24. The volume of oil delivered to the atomizer being regulated by valve 65, while an unused surplus of oil will return to the source of supply through the valve 76.

The whole burner unit constructed as here shown, is carried by a manifold arm journaled to a supporting bracket, permitting of the burner, as a whole, to be swung to, or away from the furnace opening. An annular flange on the burner casing seating against a corresponding flange on the fire-box plate, when the burner is in a closed position, being locked against movement when in the said closed position by an adjustable latch bar 32. Connecting the oil supply pipe 23 and the return flow pipe 24 to the manifold by hollow pintles 20 and 21 respectively, permits of the manifold to turn on a vertical axis without disturbing the oil supply nor the oil return flow connections to the burner unit.

The materials and finish of the several parts of this burner construction are such as the experience and judgment of the manufacturer may dictate.

Having now fully described my invention, what I claim and desire to protect by Letters Patent is:—

1. In a burner of the type specified, a pedestal bracket, a plurality of journals carried by said bracket, a manifold journaled therein, comprising a vertically disposed part having a quarter bend horizontally disposed arm part, centrally positioned and integral therewith, said manifold being adapted to swing laterally in substantially a horizontal plane, a plurality of independent tubes within the said manifold, said tubes on leaving the horizontally disposed arm part, diverge, one of the said tubes ascending, and the other of the said tubes descending within the said manifold, hollow pintle members in alinement with said tubes, rotatably secured to the upper and lower ends of the manifold, thus forming distinct conduits for an oil supply, and for the return flow of oil to and from the burner respectively, a manually operated oil flow regulating valve, having a dial and an indicator, carried by the horizontal arm part of the manifold, and positioned within the said return flow conduit, and of means for the delivery of oil from the said regulating valve to the burner.

2. In an oil burner of the type specified, in combination with a pump casing provided with an opening, a driving shaft, a packing gland mounted on said shaft, a latch bar pivotally mounted on said casing, the inner end of the said latch bar being inclined and slidable over the driving shaft in spaced relation thereto, engaging the packing gland, the outer end of the latch bar extending exterior of the casing opening, means exterior of the casing for adjustment of the latch bar to the packing gland relative to the driving shaft, to prevent binding of the packing gland on the shaft and to prevent the leakage of oil.

3. The combination with a motor driven oil burner, a casing in spaced relation to the said motor, forming air passages around the said motor, of means admitting air to the said casing, of means for air cooling the motor when in operation and of means for utilizing the said heated air by means of delivery to the burner.

4. In an oil burner construction, the combination of a fire-box plate having an opening formed therein, a frusto-conical element removably attached thereto adapted to project into the fire-box, a hollow burner casing having an enlarged fan casing part, the said fan casing part having a contracted mouth portion forming an air outlet passage, an annular flange integral with the said contracted mouth portion adapted to form a closure for the said fire-box opening, of means pivotally mounted on the said fire-box plate to keep the burner casing in a closed position, an atomizer composed of a plurality of atomizing plates, positioned centrally of the said mouth, an air circulating fan within the said casing adjacent the inner open end of the said passage, directing means for the said air-blast, an oil dispenser having an outlet adjacent the said atomizer, an oil supply pipe for the said oil dispenser extending through the said casing, adjustable pressure means regulating the said oil supply, rotating means for the said fan, the said atomizer and the said oil pressure, of means securing a rotatably mounted tubular manifold arm to the said fire-box plate, and of means for securing the said burner casing to the said manifold arm to swing on a vertical axis to, or away from the said fire-box opening.

5. In an oil burner construction the combination of a fire-box plate, a pedestal bracket secured thereto, journals carried by the said bracket, a manifold arm journaled therein, comprising a centrally divided tubular vertical standard part, having a twin tubular quarter bend horizontal arm part integral therewith and centrally positioned thereto, a pumping system having a casing, of means securing the said pump casing to the said manifold, the twin tubes of the said manifold being in alinement with their respective ports of the pumping system, a burner casing bearing a motor having a projecting shaft, an atomizer removably secured to the free end of the said shaft, fan blades carried by said shaft, of means securing a hollow burner casing to the said pump casing substantially at right angles to the plan of the said pumping system, a hollow pintle member secured at one end to the upper end

of the vertical part of the said manifold, and with the opposite end to a source of fuel oil supply; a second hollow pintle member secured with one end to the bottom end of the said vertical manifold part and with its opposite end to a return flow conduit, a control valve having a dial and a manually operated pointer, being carried by the horizontal part of the said manifold within the said return flow conduit, of means forming connections from the said valve to deliver oil to the said atomizer, a pressure gage within the return flow conduit, an automatically operated valve adjacent the said pressure gage to retard the return flow of the fuel oil below a predetermined pressure.

6. In the combination of an oil burner construction, a motor driven pumping system having a shaft, packing surrounding the said shaft, a casing inclosing the pumping system having an opening formed therein, a sliding latch bar pivotally connected to the said casing, the lower end of the said latch bar riding on the said pump shaft in operative position to the said packing, the upper end of the said bar extending upwardly through the said casing opening, of means exterior of the said casing for manual adjustment of the said latch bar.

7. In an oil burner construction, a hollow burner casing having an air inlet opening and a constricted end portion provided with an air discharge opening, a longitudinal shaft journaled within the said casing, fan blades carried by the said shaft, an atomizer comprising a plurality of atomizing plates removably mounted on one end of the said shaft, the said atomizer having its outer edge arranged in spaced relation to the edge of the air discharge opening, a fuel oil supply element mounted on the shaft, of adjustable means supplying fuel oil under pressure, a fire-box plate, a pedestal bracket secured to the said plate, a tubular manifold journaled to the said bracket to swing on a vertical axis, having a quarter bend horizontal twin tubular arm, centrally positioned and integral therewith, of means adapting the said manifold to carry the said burner casing as a whole unit, to swing to, or away from the said fire-box, and of adjustable means for keeping the burner unit in a closed position relative to the said fire-box plate.

8. A rotary oil burner comprising in combination a hollow casing, having a contracted mouth portion on one end thereof, an annular lug adjacent the said mouth, a fan within the said casing, an air duct formed within the said casing, a motor secured within the opposite end of the said casing having a projecting shaft, extending centrally outwardly of the said contracted mouth, means for admitting air around the said motor, of means conducting the air to the fan blades, of means rotating the said fan blades to force the air through the said mouth, an oil feeding member carried by the said casing, of pressure means for the said feeding member, of means controlling the said pressure means exterior of the said casing, a fire-box plate having a formed opening therein, an annular lug surrounding the said opening, a pedestal bracket secured to the said fire-box plate, a manifold journaled to the said bracket, hollow pintle members secured to the upper and the lower ends of the said manifold, a centrally divided tube within the said manifold, an arm integral with the said manifold having twin tubes, the said twin tubes being in alinement with the centrally divided tube of the said manifold, forming by means of the said pintle members conduits for a fuel oil supply and for a return flow of excessive oil respectively, of means securing the said manifold centrally at right angles to the said burner casing, to carry the burner unit when swung to, or away from the said fire-box opening and of means keeping the burner unit in a closed position relative to the said fire-box plate.

9. An oil burner construction comprising in combination a fire-box opening with a fire-box plate having a centrally located frusto-conical element removably attached thereto, an annular lug surrounding the said element, of means securing a pedestal bracket to the said fire-box plate, journals carried by the said bracket, a manifold arm comprising a centrally divided tubular vertical standard having a twin tubular quarter bend horizontal arm integral therewith, rotatably mounted to the said bracket, adapted to swing on a vertical axis, a flanged end on the said arm, a rotary pump having a casing secured to the said flanged end, the twin tubes of the manifold arm being in alinement with the ports of the said pump, hollow pintle members secured to the upper and lower ends of the said manifold, an oil supply pipe connected to the upper said hollow pintle member of the said manifold, an oil return flow pipe extending from the lower hollow pintle member of the said manifold, a pressure gage and an automatically operated release valve within the conduit of the return flow pipe, a worm gear to rotate the said pump within the said casing, the said pump having a shaft, packing surrounding the said shaft, a sliding latch bar pivotally mounted on the said pump casing, an opening formed within the said pump casing, the upper end of the said bar extending exterior of the said casing, the lower end of the said bar riding upon the said pump shaft in operative position to the said packing, of means exterior of the said pump casing for manual adjustment of the said latch bar, a hollow burner casing positioned at right angles to the said

worm gear casing and secured thereto, the said burner casing being as a whole unit carried by means of the said manifold and turnable to, or away from the said fire-box plate without disturbing the said oil supply, nor the return flow connections, the said burner casing having a contracted mouth portion, an annular lug near the said mouth to seat against the frusto-conical element of the fire-box plate, a latch pivotally mounted to the said fire-box plate to hold the said burner casing in position, a propelling motor within the said burner casing and spaced therefrom, having a projecting shaft, fan blades carried by said shaft, an atomizer removably mounted on the free end of the said shaft, centrally of the said mouth, forming an air passage between the said atomizer and the said mouth, an air circulating fan within the said casing adjacent the inner open end of the said passage, an annular oil dispenser carried by the said shaft having a contracted outlet opening within the said atomizer, a manually operated oil flow control valve secured in the said arm of the manifold in alinement with the return flow pipe, of means forming oil supply connections between the outlet of the said valve and the said atomizer, the said connections extending through the said casing, of means for the admittance of air to the said fan blades, said means comprising channels surrounding the motor, an air duct formed within the burner casing and of means for controlling the direction of the air blast within the said casing.

In testimony whereof I have affixed my signature in the presence of two witnesses.

JESSE C. JOHNSON.

Witnesses:

M. CHRISTENSEN,

A. J. BRADLEY.