E. N. SHAW.

OIL BURNER.

APPLICATION FILED APR. 23, 1909.

954,652.

Patented Apr. 12, 1910.

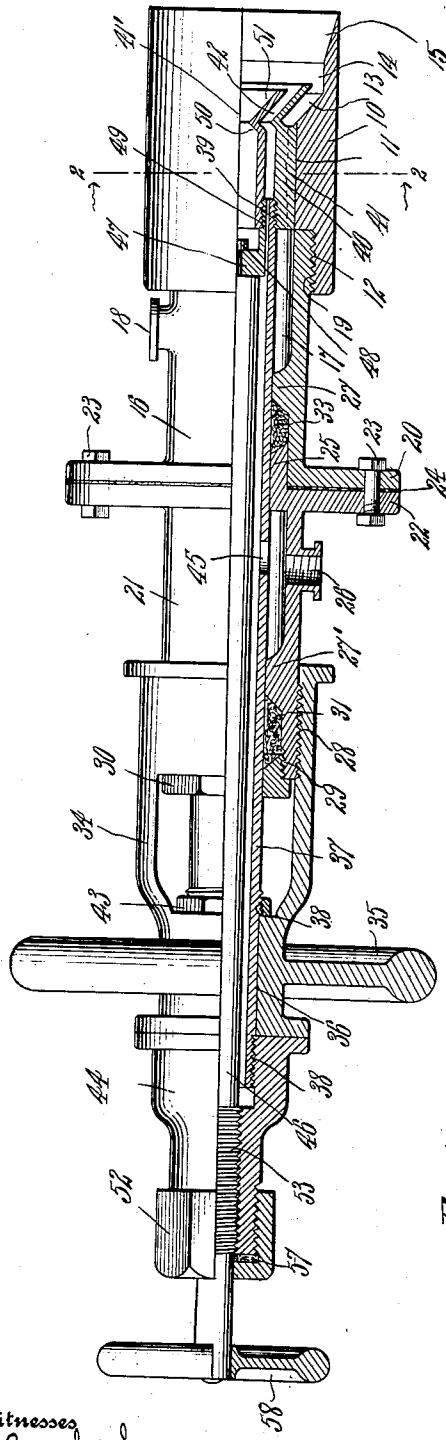

Fig. 1.

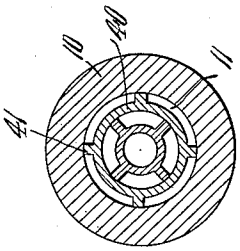

Fig. 2.

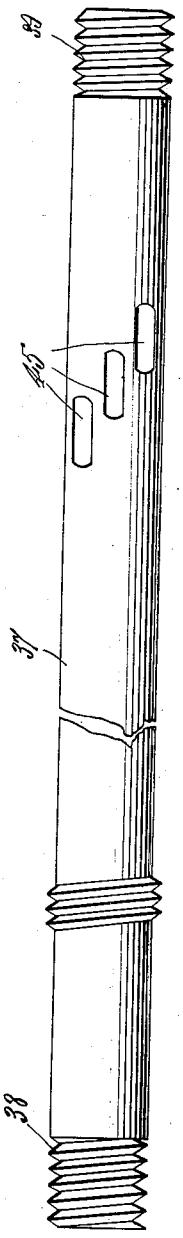

Fig. 3.

Witnesses

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# UNITED STATES PATENT OFFICE.

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## OIL-BURNER.

954,652. Specification of Letters Patent. Patented Apr. 12, 1910.

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*To all whom it may concern:*

Be it known that I, EMMERSON N. SHAW, a citizen of the United States, residing at Vallejo, in the county of Solano, State of California, have invented certain new and useful Improvements in Oil-Burners; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to oil burners and has special reference to improvement in burners adapted for use with crude oil.

One object of the invention is to improve and simplify the general construction of burners of this character.

Another object of the invention is to increase the economy in the use of oil by improving the construction of the burner so as to give improved combustion and steadiness in burning.

A third object of the invention is to provide a burner which shall have a wide and accurate range of adjustment of the nozzle together with a steady flow of oil in the generating chambers.

A fourth object of the invention is to decrease the waste oil from oversupply and dripping.

With the above and other objects in view the invention consists in general of a burner provided with steam and oil passages having a novel form of arrangement of these passages and a novel form of nozzle.

The invention further consists in certain novel details of construction and combinations of parts hereinafter fully described, illustrated in the accompanying drawings, and specifically set forth in the claims.

In the accompanying drawings, like characters of reference indicate like parts in the several views, and Figure 1 is a side elevation of a burner constructed in accordance with this invention, one-half being shown in sections. Fig. 2 is a section on the line 2—2 of Fig. 1. Fig. 3 is a detail of the oil pipe showing the manner in which oil is admitted from the oil chamber to the interior of that pipe.

In the construction of this device there is provided a nozzle tip 10, this nozzle 10 has the central portion of the interior formed with a cylindrical opening 11. The rear end of the nozzle is countersunk and is provided with screw threads 12. The front end of the nozzle has a frusto-conical portion leading from the opening 11 as indicated at 13 and this frusto-conical opening terminates in a second enlarged cylindrical opening 14 which again terminates in a frusto-conical mouth 15. The frusto-conical portion of the passage as indicated at 13 is very abrupt while the frusto-conical mouth 15 is made with a very gradual taper and brought to a sharp edge at the extreme forward part of the nozzle 10.

At 16 is shown a steam connection wherein is formed a steam chamber 17. This steam connection is provided with an inlet 18 adapted to be connected to a suitable steam pipe not deemed necessary here to be shown. This steam connection 16 is further provided with screw threads 19 which engage the screw threads 12 of the nozzle 10. At the rear end of the steam connection 16 is formed a flange 20.

At 21 is an oil connection having its front end formed as a flange 22 and bolts 23 serve to hold the flange 22 to the flange 20, suitable packing 24 being placed between the two flanges to render the joint perfectly tight. The oil connection 21 is further provided with an extended portion 25 which fits within the steam connection 16.

At 26 is shown an oil inlet which is adapted to be connected to a suitable source of oil supply not deemed necessary here to be shown.

Both the member 16 and member 21 are provided with annular flanges 27 and 27′ respectively around the interior thereof for purposes hereinafter to be described. To the rear of the flange 27′ of the member 21 is an external screw thread 28 and an internal screw thread 29. Engaged with the internal screw thread 29 is a packing nut 30 and between the rib 27′ of the member 21 and this packing nut is held suitable packing 31 while between the portion 25 of the member 21 and the rib 27 of the member 16 there is held other packing 33.

Mounted on the threaded portion 28 of the member 21 is a yoke 34 provided with a hand wheel 35 and a centrally disposed bore 36. Extending through the bore 36 is an oil pipe 37 provided on each side of the bore 36 with threaded portions 38 and 38′. This oil pipe extends through the members 21 and 16 and the packing nut 30 being supported in the members 21 and 16 on the internal ribs 27 and 27′. The forward end of

this oil pipe terminates in a threaded portion 39 which carries a steam regulating valve provided with a cylindrical body portion 40 having ribs 41 formed thereon which serve to hold the valve centrally of the cylindrical opening 11 in the nozzle 10. Beyond the ribs 41 the valve is formed with an inwardly directed frusto-conical portion 41′ beyond which it flares outwardly in a frusto-conical portion 42, the larger end of which is spaced from the cylindrical portion 14 of the nozzle. A nut 43 is held upon the forward threaded portion 38 while a stuffing box 44 is held upon the rear portion 38′. The tube 37 constitutes the oil supply tube and for the purpose of admitting oil to the tube from the oil connection 21 there is provided a plurality of staggered openings 45 in the tube 37, these openings being so arranged as to lie within the oil connection 21.

An oil valve stem 46 extends through the stuffing box 44 and terminates adjacent the end of the oil tube 37 where it is provided with a reduced end 47 whereon is mounted a swivel nut 48 which has its forward end threaded to receive the rear end of an oil valve provided with a body portion 49, a reduced inwardly directed frusto-conical portion 50 and an outwardly directed frusto-conical portion 51, the two frusto-conical portions being substantially parallel to the portions 41′ and 42 of the steam regulating valve 40.

Upon the stuffing box 44 is provided a gland nut 52 and the interior of this stuffing box is threaded to receive a threaded portion 53 of the stem 46. Between the gland 52 and the stuffing box 44 is suitable packing 57. A hand wheel 58 is secured to the stem 46 so that the latter may be rotated thereby.

In the operation of the device the steam inlet 18 is connected to a suitable steam pipe and the oil inlet 26 is connected to a suitable oil pipe supplied in each instance from any desired source. Let it be supposed that both of the valves are closed. The hand wheel 35 is first operated to open the valve 40 to permit steam to flow out of the nozzle 10. As the steam passes out of the nozzle the irregular passages made by the constricted and broadened portions of the steam valve and the frusto-conical portion 13 of the nozzle cause the steam to strike violently against the cylindrical portion 14 of the nozzle and a portion of the steam is thereby deflected therefrom in an inward direction while the remainder of the steam flows out over the frusto-conical portion 15 of the nozzle 10. By this peculiar arrangement the steam not only produces a vacuum in the center of the steam flow but also is directed inward for purposes which will now be described. After the steam valve has been opened the hand wheel 35 is held stationary while the hand wheel 58 is rotated to open the oil valve. By reason of the peculiar shape of the oil and steam valves the oil will flow in through the cylindrical portion of these valves, be deflected inward, and from thence be directed outward in a frusto-conical sheet. As the oil flowing out in this manner strikes the steam flowing out from the steam outlet it is entrained and carried toward the center by the steam reflected from the cylindrical portion 14 while at the same time any oil that may escape from this part of the steam is caught by the expanding steam from the frusto-conical portion 15. In this manner all waste of oil is absolutely prevented and all of the oil is caught up and atomized by the steam.

It will be apparent that by the peculiar construction of the steam and oil valves the flow of the steam and oil may be regulated to an absolute certainty so that the purposes of this invention will be fully and completely accomplished.

There has thus been provided a simple and efficient device of the character described and for the purpose specified.

It is obvious that many minor changes may be made in the form and construction of this invention without departing from the material principles thereof. It is not therefore desired to confine the inventions to the exact form herein shown and described but it is wished to include all such as properly come within the scope of the appended claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent, is:—

1. In an oil burner, a nozzle provided with an opening therethrough comprising a cylindrical inlet portion, an abruptly flaring portion extending therefrom, a second enlarged cylindrical portion extending from the flaring portion, and a second gradually flaring terminal portion; in combination with an adjustable steam valve held to move longitudinally in said nozzle, comprising a body portion concentric with the cylindrical portion of the nozzle and spaced therefrom, a reduced portion extending from said cylindrical portion, and a flaring terminal portion concentric with the abruptly flaring portion of the nozzle.

2. In an oil burner, a nozzle provided with an opening therethrough comprising a cylindrical inlet portion, an abruptly flaring frusto-conical portion extending therefrom, a second enlarged cylindrical portion extending from the flaring portion, and a gradually flaring frusto-conical terminal portion; in combination with an adjustable steam valve held to move longitudinally in the nozzle comprising a cylindrical body portion concentric with the cylindrical portion of the nozzle and spaced therefrom, a reduced frusto-conical portion extending therefrom,

and a flaring frusto-conical terminal portion concentric with and symmetrical to the abruptly flaring portion of the nozzle.

3. In an oil burner, a nozzle provided with an opening therethrough comprising a cylindrical inlet portion, an abruptly flaring portion extending therefrom, a second enlarged cylindrical portion extending from the flaring portion, and a gradually flaring terminal portion; in combination with a steam valve held to move longitudinally in the nozzle comprising a cylindrical body portion concentric with and spaced from the cylindrical portion of the nozzle opening, a hollow reduced portion extending therefrom, and a hollow flaring terminal portion concentric with and symmetrical to the abruptly flaring portion of the nozzle, an oil supply tube connected to said steam valve, and an oil valve held in said steam valve symmetrical therewith.

4. In an oil burner, a nozzle provided with an opening therethrough comprising a cylindrical inlet portion, an abruptly flaring frusto-conical portion extending therefrom, a second enlarged cylindrical portion extending from the flaring portion, and a gradually flaring frusto-conical terminal portion; in combination with a hollow steam valve held to move longitudinally in the nozzle comprising a hollow body portion concentric with and spaced from the cylindrical portion of the opening through the nozzle, a hollow reduced frusto-conical portion extending therefrom, and a hollow flaring frusto-conical portion concentric with and symmetrical to the abruptly flaring portion of the nozzle opening, an oil supply tube connected to said steam valve, and an oil valve held in said steam valve symmetrical therewith.

5. In an oil burner, a nozzle provided with an opening therethrough comprising a cylindrical inlet portion, an abruptly flaring portion extending therefrom, a second enlarged cylindrical portion extending from the flaring portion, and a gradually flaring terminal portion; in combination with a steam valve held to move longitudinally in the nozzle comprising a cylindrical body portion concentric with and spaced from the cylindrical portion of the nozzle opening, a hollow reduced portion extending therefrom, and a hollow flaring terminal portion concentric with and symmetrical to the abruptly flaring portion of the nozzle, an oil supply tube connected to said steam valve, an oil valve held in said steam valve symmetrical therewith, and means for adjusting each of said valves lengthwise of the nozzle.

6. In an oil burner, a nozzle provided with an opening therethrough comprising a cylindrical inlet portion, an abruptly flaring frusto-conical portion extending therefrom, a second enlarged cylindrical portion extending from the flaring portion, and a gradually flaring frusto-conical terminal portion; in combination with a hollow steam valve held to move longitudinally in the nozzle comprising a hollow body portion concentric with and spaced from the cylindrical portion of the opening through the nozzle, a hollow reduced frusto-conical portion extending therefrom, and a hollow flaring frusto-conical portion concentric with and symmetrical to the abruptly flaring portion of the nozzle opening, an oil supply tube connected to said steam valve, an oil valve held in said steam valve symmetrical therewith, and means for adjusting each of said valves lengthwise of the nozzle.

In testimony whereof, I affix my signature, in presence of two witnesses.

EMMERSON N. SHAW.

Witnesses:
W. FRANK WILLSEY,
RICHARD THOMAS.