A. H. BALLARD.

ROTARY OIL BURNER.

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1,294,026.

Patented Feb. 11, 1919.

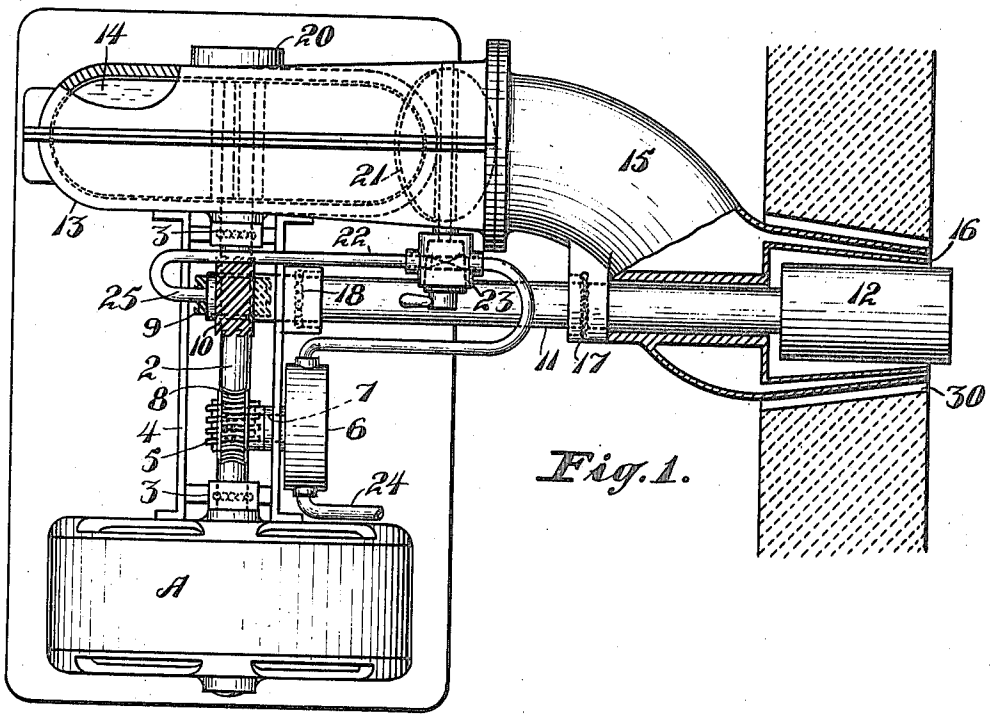


Fig. 1.

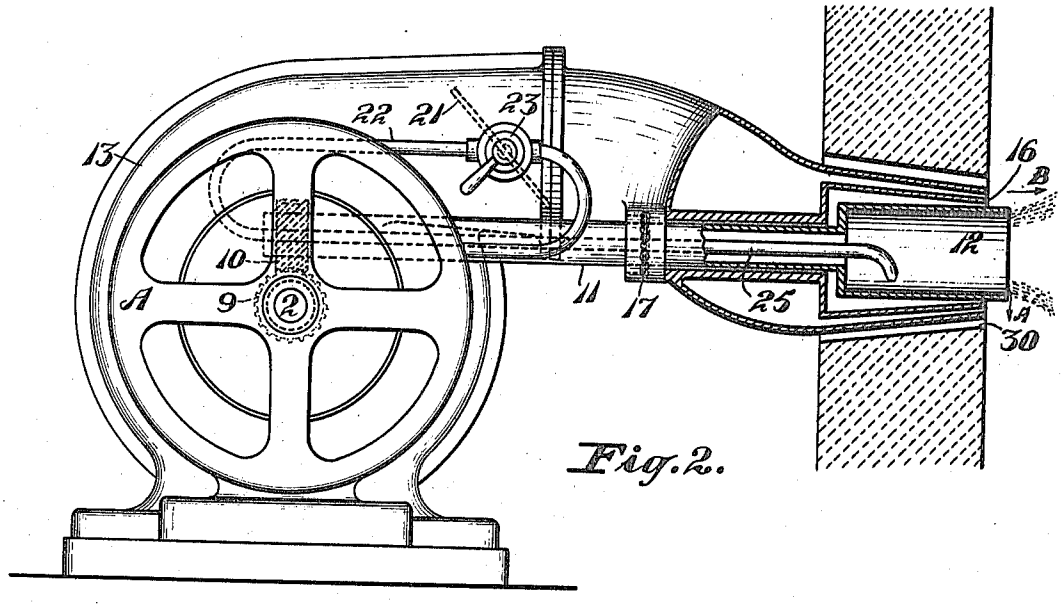


Fig. 2.

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UNITED STATES PATENT OFFICE.

ARTHUR H. BALLARD, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO BALLARD OIL BURNING EQUIPMENT COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

ROTARY OIL-BURNER.

1,294,026. Specification of Letters Patent. Patented Feb. 11, 1919.

Application filed April 25, 1918. Serial No. 230,824.

To all whom it may concern:

Be it known that I, ARTHUR H. BALLARD, a citizen of the United States, residing at the city and county of San Francisco and State of California, have invented new and useful Improvements in Rotary Oil-Burners, of which the following is a specification.

This invention relates to a rotary oil burner, and particularly to that type of burner in which the oil is atomized by centrifugal action and projected into the furnace by an air blast.

One of the objects of the present invention is to provide a novel form of air distributing nozzle by which the oil when atomized by centrifugal action may be further atomized by the air discharging from the nozzle and projected into the furnace.

Another object of the invention is to provide means for automatically maintaining a predetermined proportion between the air and oil, *i. e.*, a constant proportion between the oil supplied and the air passing through the nozzle. For instance, if it is desired to burn a small flame within the furnace, then it is obvious that it will be necessary to reduce the quantity of oil admitted. It is, therefore, one of the objects of the invention to reduce the amount of air admitted in proportion to the oil supplied.

Further objects will appear hereinafter.

The invention is illustrated by way of example in the accompanying drawings, in which—

Figure 1 is a plan view in section or partially in section, showing the application of the invention to a furnace.

Fig. 2 is a side elevation of the same.

Referring to the drawings in detail, A indicates an electric motor of suitable construction, and 2 the shaft which is journaled in the same. One end of this shaft is projected as shown, and in this instance, supported in ball bearings 3, mounted in a housing 4, secured at one end of the motor casing or otherwise supported; secured on the shaft within the housing is a worm 5, and mounted on one side of the housing is a gear pump 6 of suitable construction, the shaft 7 of which is driven by a worm gear 8, intermeshing with the worm 5; also secured on the motor shaft within the housing is a pair of spiral gears 9 and 10; the gear 9 being secured on the motor shaft, while the gear 10 is secured on a hollow shaft 11, which carries the centrifugal atomizer generally indicated at 12. Mounted in alinement with the motor, and the housing 4 is a blower, the housing of which is shown at 13. The fan or blower proper shown at 14 is secured on the motor shaft, and is, therefore, driven and revolves in unison with the same. Forming an extension of the housing 13 is a casing 15, in the outer end of which is secured a hollow nozzle 16. This nozzle surrounds the centrifugal atomizing cup and is provided for the purpose of discharging an annular column of air exterior of the cup. Formed on one end of the housing 15 is a bearing projection for the reception of an anti-friction ball bearing 17. This ball bearing, together with a second ball bearing 18, mounted in the housing 4, forms a support for the hollow shaft 11, and as this shaft is provided with a spiral gear 10, which intermeshes with the gear 9, secured on the motor shaft, it can readily be seen that the shaft, together with the atomizing cup 12 secured thereto, will be revolved in unison with the motor. The housing 15 is connected with the outlet or discharge opening of the blower, the air being admitted to the housing through an opening 20 in the usual manner. Mounted in the housing is a pivotally mounted damper 21, and mounted on the pipe line 22 in direct alinement with the damper 21 is a valve 23 which regulates the quantity of oil supplied to the atomizing cup 12. Oil may be delivered to the gear pump 6 from any suitable source through a pipe 24, and discharges from the pump through the pipe 22, and passes through the valve 23. It is finally delivered to a pipe 25, extending through the hollow shaft, and as this opens directly into the cup 12 it can be seen that the oil supplied by the pump 6 will be delivered directly into the cup, from which it discharges by centrifugal action, and is thus thoroughly atomized. The damper 21 is secured on the stem of the valve 23, and as the handle of said stem is moved to increase or decrease the amount of oil passing through the valve it can be seen that the damper will move in unison with same, and thereby regulate the quantity of air discharging from the blower and escaping through the hollow nozzle 16. A

constant proportion is thus maintained at all times. If a large quantity of oil is being delivered to the atomizing cup, a comparatively large quantity of air will simultaneously discharge through the nozzle, while if the quantity of oil delivered is reduced, the volume of air escaping from the blower will be proportionally reduced. The fan housing 13, motor A, and the housing 3 may be mounted on a suitable form of base, and this may in turn be carried by a swinging arm if desired to permit the burner as a whole to be swung to or from the opening 30 in the furnace.

In actual operation with oil passing through the stationary pipe 25 and depositing in the cup 12, which is rotated at a comparatively high speed, sufficient centrifugal force is obtained to distribute the oil evenly over the interior surface of the atomizer, and to discharge it from the outer end of the atomizer in the direction of arrow A. The blower rotating in unison with the atomizer and the motor will at the same time discharge air through the housing 15 and the hollow nozzle 16, and this escaping from the end of the nozzle in the direction of arrow B will, of course, transverse the oil spray discharged by the atomizer, thus further atomizing the oil and simultaneously carries it forward into the furnace where combustion takes place.

One of the features of the present invention is the hollow air discharging nozzle provided. This serves as a means for keeping the air out of contact with the atomizing cup, and thus permits radiated heat to preheat the oil before it can discharge therefrom. This feature can not be obtained where the air passes over the exterior surface of the atomizing cup, as it cools it to such an extent that preheating the oil to any extent can not be obtained.

A further advantage of employing a hollow or double walled nozzle having an annular air duct formed therein is the elimination of any tendency to impart a swirling movement to the air discharging through the nozzle. Most burners operating on the principal here shown are subject to this defect, *i. e.*, the air passes between the nozzle and the rotating atomizer; a swirling movement is thus imparted to the air which materially decreases the atomizing efficiency of the air when discharging from the nozzle. The structure here shown entirely eliminates this tendency, and is, therefore, more efficient.

Another important feature is the means for regulating the flow of air and oil in unison. This is important as reduction of the quantity of oil without changing the air flow either causes the flame to be blown out or the furnace to be rapidly cooled, this being due to the fact that more air than is required for combustion is admitted. This defect is, however, overcome by controlling the two factors as previously described. While the valve 23 and damper 21 is here shown as provided with a handle for manual operation, it is obvious that this handle can be connected with an automatic regulator if desired.

I similarly wish it understood that the materials and finish of the several parts employed may be such as the experience and judgment of the manufacturer may dictate.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. The combination with a centrifugal atomizing cup and means for delivering oil thereto of a hollow nozzle having an outlet surrounding said atomizing cup, and means for forcing air through the outlet of said nozzle and out of contact with the cup periphery.

2. The combination with a centrifugal atomizing cup and means for delivering oil thereto of a hollow nozzle surrounding said atomizing cup, means for forcing air through said nozzle, means for regulating the quantity of oil delivered to the atomizer, means for regulating the amount of air passing through the nozzle, and means for simultaneously operating each of said oil and air regulating means.

3. The combination with a centrifugal atomizing cup and means for delivering oil thereto of a hollow nozzle surrounding said atomizing cup, means for forcing air through said nozzle, and means operable in conjunction with said last named means for simultaneously regulating the quantity of oil passing through the nozzle so that a predetermined proportion of oil and air will discharge in unison.

4. The combination with a centrifugal atomizing cup and means for delivering oil thereto of a stationary housing surrounding and inclosing the cup, a second housing inclosing the first named housing and spaced therefrom to form an annular air duct, said housings having their outer ends spaced to provide an air outlet, and means for forcing air through said duct and outlet and out of contact wth the cup periphery.

5. The combination with a centrifugal atomizing cup and means for delivering oil thereto of a stationary housing surrounding and inclosing the cup, a second housing inclosing the first named housing and spaced therefrom to form an annular air duct, said housings having their outer ends spaced to provide an air outlet, means for forcing air through said duct, and outlet and out of contact with the cup periphery, and means for maintaining a predetermined proportion between the air passing through the duct and the oil delivered to the cup.

6. A rotary oil burner comprising a motor, a blower connected with and driven by said motor, a centrifugal atomizing cup adapted to be rotated by the motor, means for delivering oil to the atomizing cup, a double walled nozzle surrounding the atomizing cup, and having an annular air passage formed therein and an outlet between the walls at the outer ends thereof, and means for delivering the air from the blower directly into said annular passage in the nozzle and through said outlet.

7. A rotary oil burner comprising a motor, a blower connected with and driven by said motor, a centrifugal atomizing cup adapted to be rotated by the motor, means for delivering oil to the atomizing cup, a double walled nozzle surrounding the atomizing cup, and having an annular air passage formed therein, means for delivering the air from the blower directly into said annular passage in the nozzle, a valve adapted to regulate the quantity of oil delivered to the atomizing cup and a damper connected with said valve and movable in unison with the same adapted to regulate the volume of air passing through the nozzle.

8. In an oil burner, a rotary oil nozzle, and means to convey and discharge air in surrounding relation to the oil nozzle and out of contact therewith.

9. In an oil burner, a rotary oil nozzle, and an air nozzle surrounding the oil nozzle and having a hollow interior and a discharge to deliver air out of contact with the periphery of the oil nozzle and adjacent the points of discharge of the latter.

10. In a rotary oil burner, an oil nozzle, an air nozzle associated therewith, means to regulate the amount of oil delivered to the oil nozzle, means to regulate the amount of air delivered to the air nozzle, and means to effect simultaneous operation of each of said regulating means whereby to maintain a constant proportion between the oil and air.

11. In a rotary oil burner, an oil nozzle, an air nozzle associated therewith, means to regulate the amount of oil delivered to the oil nozzle, means to regulate the amount of air delivered to the air nozzle, and a common operating means in connection with each of said regulating means to effect simultaneous operation thereof.

12. In a rotary oil burner, an oil nozzle, an air nozzle associated therewith, means to regulate the amount of oil delivered to the oil nozzle, means to regulate the amount of air delivered to the air nozzle, a shaft carrying each of said regulating means, and means to operate the shaft and thereby simultaneously operate each of said regulating means.

13. In an oil burner, a rotary oil nozzle, and means to discharge air adjacent the nozzle discharge and in surrounding relation to the nozzle and out of contact with the latter.

14. In an oil burner, a rotary oil nozzle, and stationary means to discharge air adjacent the nozzle discharge and in surrounding relation to the nozzle and out of contact with the latter.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

ARTHUR H. BALLARD.

Witnesses:
JOHN H. HERRING,
W. W. HEALEY.