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OIL BURNER

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OIL BURNER

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This invention relates to liquid fuel burners for general application and of that type wherein the fuel is atomized by steam, gas or air after delivery through the burner outlet.

away and in section of a burner embodying the features of the invention.

Figure 2 is a front end elevation on an enlarged scale of the improved burner head complete.

Figure 3 is a horizontal section on the line 3—3 Figure 1 on an enlarged scale.

Figure 4 is a view in elevation on a larger scale than Figure 1 of the valve for controlling the fuel orifice and a portion of the controlling rod therefor.

The numeral 5 designates a burner head having a liquid fuel line or pipe 6 connected to the lower portion thereof, and a steam, air or gas line or pipe 7 attached to its upper portion. The head 5 comprises an upper receiver 8 and a lower receiver 9, the upper receiver having the line or pipe 7 attached to the rear extremity thereof and communicating with a chamber 10 having a bottom fan shaped outlet 11, and a stud, bolt or analogous device 12 extending vertically therethrough and having an upper screw threaded extremity to which is applied a socket nut 13 and a lower screw threaded terminal 14, which is secured in the upper portion of the lower receiver 9 for the fuel, as clearly shown by Figure 1. Portions of the stud bolt 12 are cut away to form two flat faces 16 which converge at their forward edges, as at 17, to provide opposite clearances or passages relatively to the adjacent portions of the walls of the chamber 10 for the outlet and centralized direction of the steam, air or gas entering the chamber 10 and passing through the outlet 11. The chamber 10 for a short portion of its length is of about the same diameter as the bore of the line or pipe 7, and then gradually increases in width towards the outlet 11, as shown by Figure 1, by suitably shaping and gradually curving the wall of the said chamber so that the stud bolt embodying the deflector may be effective in directing the steam, air or gas under pressure into the outlet 11. As clearly shown by Figure 2, the outlet 11 does not extend completely through the opposite sides of the lower terminal of the receiver, and it will be understood that the said outlet of the receiver 8 as a whole as well as the receiver 9

The essential object of the invention is to practically control the fuel supply by varying the size of the outlet or orifice of the burner and thereby procure perfect combustion at varying temperatures with considerable saving of fuel, as well as to avoid the necessity of continually changing burner tips to obtain higher or lower temperature.

A further object of the invention is to avoid the necessity of changing burners so that, when a burner with the outlet or orifice adjusting feature is once put into a furnace, it can remain in its applied position and be operable to compensate for higher or lower temperatures without withdrawing the burner from its installed position for adjustment or other manipulation.

A further object of the invention is to provide a liquid fuel burner that is self cleaning and to thus avoid the necessity of dismantling or disconnecting the burner and removing the same for cleaning purposes.

A further object of the invention is to provide a fuel burner adapted to cover the range of maximum or minimum temperature in a furnace when a burner of a predetermined or suitable size is once installed.

A still further object of the invention is to generally improve liquid fuel burners by simplifying the construction and operation thereof and render them more durable and easier to handle, and also provide for regulation of the fuel sprayed or atomized by the burner by means located exteriorly of the furnace in which the burner is mounted.

With these and other objects and advantages in view, as will hereinafter appear, the invention consists in the preferred forms of construction and arrangement hereinafter described and claimed and subject to such modifications as may be contemplated by the scope of appended claim.

In the accompanying drawings:—

Figure 1 is a side elevation partially broken

may be modified in dimensions in accordance with the particular application of the burner head and the desired function of the same in various types of furnaces. The receiver 9 is closely associated and held intact with the receiver 8 and has mounted in the forward extremity thereof a valve 18 of substantially truncated cone shape rotatably mounted in a correspondingly shaped valve seat 19 opening out through the front extremity of the receiver 9 and having a bore 20 extending longitudinally through the said latter in communication with the line or pipe 6. The valve 18 has a rod or stem 21 secured thereto by a lock nut and suitable threaded construction, as at 22, the rod or stem 21 continuing rearwardly through the line or pipe 6 and being both rotatable and longitudinally movable within the latter to adjust the valve. At the central portion of the valve seat 9 is an orifice 23 which is mainly located in advance of the fan shaped outlet 11 of the member 8 for the steam, air or gas, the upper terminal of the orifice 23 being close enough to the outlet 11 to permit the steam, air or gas to flow thereover and take up and atomize or comminute the fuel that may be fed to the orifice 23 by way of the receiver 9. The quantity of the fuel supplied to the orifice 23 will depend entirely upon the adjustment of the conical valve 18, the said valve and rod or stem 21 being rotatable in reverse directions to control the exit of the fuel supplied to the member 9 and admitted to the orifice 23. The valve 18 is preferably of the form shown on an enlarged scale by Figure 4 and has a comparatively wide lip 24 which gradually tapers to an opposite narrower lip 25 and has an intermediately rearwardly projecting boss or apron 26, which is adapted to movably bear against the wall of the seat 19. The amount of liquid fuel supplied to the orifice 23 will depend upon the adjustment of the valve 18, as heretofore indicated, and as the valve is turned, for instance to the left, an edge of the boss or apron 26 will move past the orifice 23 and thus permit a greater flow of fuel past the angular space 27 and through the orifice 23. The amount of fuel flowing through the orifice 23 will depend on the degree of rotation of the valve 18 to the left. An adjustment of the valve 18 in a reverse direction, or to the right, will reduce the flow of fuel through the orifice 23, or, entirely cut-off such flow.

The line or pipe 6 is connected to a union 28 having a stuffing box 29 connected to its rear end, the rod or stem 21 continuing through the union and said stuffing box 29, and also through a graduated dial 30 and rearwardly from the latter to a hand wheel 31 which is secured to the rear screw threaded extremity 32 of said rod or stem by lock nuts 33. The dial 30 has a hub 34 secured to the rod or stem 21 by a keypin 35, and in advance

of the said dial the rod 21 is screw threaded, as at 36, and has an adjusting nut 37 applied thereon between which and a stop nut 38, a spring 39 surrounds the said rod. The nut 37 constitutes a regulating nut, and between the stop nut 38 and the stuffing box 29 the angular member 40 of a horizontal pointer 41 is secured and permanently held in place, the said pointer having a rear reduced extremity 42 extending over the upper portion of the dial 30. The dial 30 is calibrated to correspond to the pressure of the steam, air or gas supplied through the line or pipe 7, and the valve 18 is retained in its valve seat 19 and is held in place in accordance with a predetermined adjustment through the medium of the regulating nut 37 which will be adjusted forwardly and backwardly to increase or decrease the tension of the spring 39.

Secured to the lower extremity of the union 28 is a fuel supply pipe 43 extending to any suitable source of supply and having a fuel cock 44. To the upper extremity of this union 28 a branch steam pipe 45 is connected and has a valve 46 of suitable form applied thereto, said latter connection continuing up to the lower extremity of a T-coupling 47. To the upper extremity of this T-coupling a steam, air or gas supply pipe 48 is secured and provided with a controlling valve 49. Between the side outlet of the T-coupling 47 and the line or pipe 7 a union connection 50 is interposed, and steam, air under pressure or gas may be thus regularly supplied to the line or pipe 7 and the chamber 10 of the receiver 8 of the burner head 5. Under ordinary operation, the valve 46 will be closed, so that steam, air under pressure or gas will be directly supplied through the pipe 48 to the union connection 50 and to the line or pipe 7 in accordance with the requirements of the burner and particularly suitable to the adjustment of the orifice 23 through the medium of the valve 18. It will be understood that the dial will indicate to the operator at the exterior of the furnace the adjustment required to meet the practical operation of the burner in accordance with conditions, and the pointer 41 cooperating with said dial will provide means for the correct starting point of the dial. After the adjustment of the spring 39 through the regulating nut 37 to provide for the operation of the burner in accordance with the pressure necessary for effective operation, the said spring and nut remain in their preliminary adjusted positions, and the orifice 23 may be modified at the will of the operator by actuating the hand wheel 31 and the dial 30 so that the burner is continually under control, and the fuel will be expended and utilized in the most effective and economical manner.

As heretofore also indicated, the burner is so constructed that when it is once put into a furnace there should be no necessity

to remove it again for any purpose, especially in view of a cleaning attachment which is a very essential part of the installation of each burner, and whereby the latter is made self-cleaning and eliminates necessity of dismantling the burner for cleaning purposes. As shown particularly by Figure 1, the cleaning attachment involves the valve 46 which is normally closed and the fuel cock 44 which is normally open when the burner is functioning in its normal condition. In cleaning the burner as shown particularly by Figure 1, by turning back the nut 37 and thus releasing the spring 39, the rod or stem 21 is permitted to project the valve 18 into the desired dotted line position from the burner head, the fuel cock 44 being previously closed and the valve 46 opened to permit steam, air under pressure or gas to pass through the lead or pipe 6 and thoroughly clean the bore 20, valve seat 29 and the orifice 23, as well as the angular space 27, between the lip 24 and the projecting boss or apron 26. During this cleaning operation the steam, compressed air or gas is also permitted to pass into and through the receiver 8 and by this means a thorough blowing out or cleaning of the entire burner head ensues until a thorough cleaning operation is completed, whereupon the nut 37 and spring 39 are again reset for operation of the valve 18 and the orifice 23 suitably opened, the valve 46 being closed and the fuel cock 44 reopened. The sediment or other accumulations in the burner head which has been removed by the steam, air under pressure or gas permitted to blow therethrough is deposited in the furnace in which the burner is mounted.

It is obvious that the general dimensions may be modified so as to project a flame of elongated and comparatively narrow extent or a flame of shorter and wider extent in accordance with the dimensions and requirements of the furnace in which it is installed. This change is but a modification of the proportions and dimensions and does not in the least affect the structure or practical operation of the improved burner.

The flow of fuel through the orifice 23 is readily controllable from the exterior of the furnace in which the burner is installed. This is an important feature of the present improved burner, especially in view of the fact that the cleaning of the lines or conveying pipes is accomplished by the same agent used for expelling and atomizing the liquid fuel without removing or dismantling the burner or resorting to any complex manipulation of the several parts to obtain a constant or uniform advantageous working condition of the burner.

What is claimed as new is:—

A burner of the class described including a tubular fuel-directing member operably connected through valve connections to a fuel

supply and a cleansing supply, an atomizing device, a conduit connected to said atomizing device, a valve stem mounted in said tubular member for rotary and longitudinal movement and operable from the rear end of said tubular member, a receiving chamber connected to the outlet end of said tubular member and having an outwardly flaring conical outlet bore and an outlet orifice through its upper wall, and a frusto conical valve mounted upon the forward end of said stem and shaped to rotatably and slidably fit in the conical bore of said receiving chamber, said valve having a cam edge and an apron movable across the outlet orifice of said receiving chamber by rotation of said stem for controlling the quantity of fuel delivered to the orifice and being capable of being completely unseated from said conical bore by longitudinal movement of said stem.

In testimony whereof we have hereunto set our hands.

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