Jan. 21, 1947. D. C. BREAULT 2,414,442

BURNER CONSTRUCTION

Filed Feb. 3, 1944

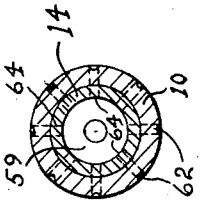


Fig. 4

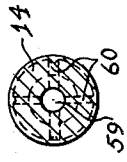


Fig. 3

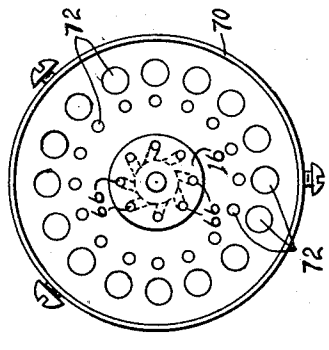


Fig. 2

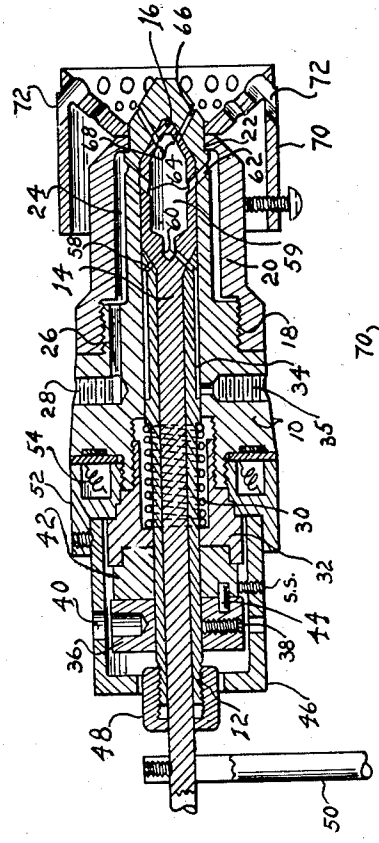


Fig. 1

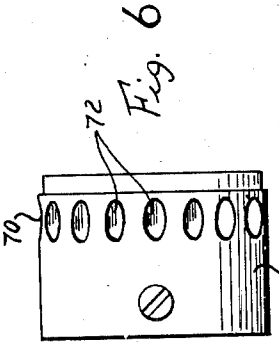


Fig. 6

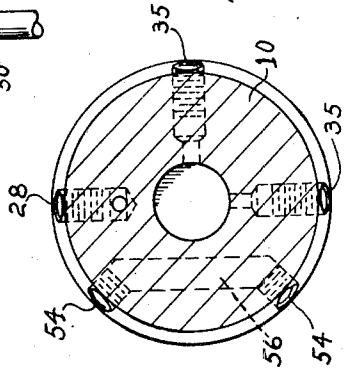


Fig. 5

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BURNER CONSTRUCTION

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7 Claims. (Cl. 299—144)

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This invention relates to burner constructions particularly adapted to the burning of liquid fuels.

Objects of the invention include the provision of a liquid fuel atomizing and burning unit comprising means forming a closed chamber for the mixing of the liquid fuel with a gas under pressure, such as air, in a manner to completely atomize the liquid and producing a fluid fuel-laden, gas-like fog by a direct, head-on impingement of the gas and liquid, and including a novel and simplified control whereby the liquid and gas are simultaneously controlled by a single, easily operated valve; the provision of a burner as aforesaid wherein the valve also controls the egress of the fuel-fog; and the provision of means adjustably admitting atmospheric air to the flame region, said means being likewise controlled by the same device, so that the liquid fuel, the gas under pressure, the atmospheric air, and the fuel-laden gas-fog are capable of uniform or calibrated simultaneous adjustment for more efficient operation and burning and resulting in extremely economical operation using light or heavy oils.

Further objects of the invention include the provision of a novel pre-heater in the form of a coil which also serves as an atmospheric air director and control device and the provision of a novel atmospheric air intake adjustment device.

Other objects and advantages of the invention will appear hereinafter.

Reference is to be had to the accompanying drawing, in which

Fig. 1 is a longitudinal section through a burner embodying the invention;

Fig. 2 is an elevational view of the burner looking at the forward end thereof;

Fig. 3 is a sectional view through the valve showing the liquid fuel orifices;

Fig. 4 is a sectional view through a part of the valve showing the gas orifices;

Fig. 5 is a sectional view through a part of the casing of the valve; and

Fig. 6 is a view in elevation of the atmospheric air director.

Fig. 1 illustrates the detailed construction of the burner which comprises a generally cylindrical housing 10 which is hollow to accommodate a central longitudinal bushing or tube 12 in turn accommodating the valve 14. Housing 10 is elongated and reduced forwardly and terminates in a closed nose 16 and at 18 the housing is threaded for the reception of a cap 20, supported and centered at its forward end by a shoulder 22.

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Cap 20 is spaced for the major portion of its length from the elongated part of the housing 10 forming a chamber 24 which is circular and surrounds the housing, and communicating with this chamber there is a passage 26 leading from an inlet port 28.

Bushing 12 is rotatable in the housing but is frictionally held by a spring 30 which reacts against a bushing 32 secured to the housing as by screw threads. Bushing 12 is reduced in diameter to form a circular chamber 34 between itself and the interior wall of the housing 10. Port 35 communicates with this chamber.

When the parts are assembled, the bushing 12 tends to remain as set due to the spring, but can be rotated by means of an element 36 secured thereto by a set screw 38, the element having a slot 40 for reception of a lever wrench. A spacer 42 is interposed between the element 36 and bushing 32 to allow for relative rotation of these parts while still having a close fit of the parts. A pin 44 allows for axial movement while preventing relative rotation of the spacer 42 and element 36.

A cap 46 houses the parts just described and a cap nut 48 terminates bushing 12. A handle or lever 50 is secured to the valve rod and serves to accomplish all adjustments of the device.

A separate element 52 forms a part of housing 10 and contains an electric coil 54 in a passage 56 for heating the housing and associated parts, and passage 56 provides for a separate steam heating thereof. These heating devices are not necessary to successful operation but benefit the ignition of heavy oil.

Bushing 12 is provided with a series of ports or orifices 58 at its forward end, and these orifices provide communication from chamber 34 to the mixing chamber 59, in cooperation with a complementary series of ports or orifices 60 in the valve 14. In like fashion, but oppositely directed, ports 62 in the housing 10 lead into the mixing chamber from chamber 24 in cooperation with a second series of orifices 64 in the valve.

The nose 16 of the housing 10 is drilled in a series of orifices at 66 which correspond with a series of like orifices 68 in the nose of the valve, and it will be noted that the mixing chamber is in the valve and is closed except for the above mentioned orifices, and that the valve is rotatable and bears on the interior of the housing nose 16 and on the bushing 12 at complementary angles, spring 30 serving to maintain the valve in its seat in the nose.

Thus the port 35 may direct material to the mixing chamber through chamber 34 and port

28 may direct material in opposition thereto, interiorly of the mixing chamber through chamber 24 and orifices 64, while the mixed materials egress through orifices 66 which may be tangential as shown in Fig. 2, if desired, for additional turbulation. If the handle 50 is moved angularly, the valve 14 will be rotated and this varies the area formed by the junction of orifices 58, 60; 62, 64; and 66, 68, so that three separate and distinct adjustments are simultaneously accomplished. Where, as in the usual case, oil is pumped into chamber 34 and compressed air into chamber 24, the several streams will impinge upon each other in the mixing chamber, thus breaking down the oil into a fog which will be forced out through the nose of the housing where it ignites. This fog is in fact an oil-laden gas, the particles of oil being so small as to be in a colloidal state. The direct head-on impingement causes this result which is extremely beneficial to economical burning.

The forward end of cap 20 supports a member 70 in spaced relation thereto and surrounding the same. The member 70 allows the injection or induction of atmopheric air into the space between the interior of the same and the cap 20 and directs the air by means of a series of angularly disposed apertures 72 into the region of the flame.

In the ordinary use of the device, the fuel will be oil and the gas will be air, but it is easily conceivable that other fuels or other gases may be used instead.

Having described my invention and the advantages thereof, I do not wish to be limited to the details herein disclosed, otherwise than as set forth in the claims, but what I claim is:

1. In a device of the class described, a housing, a chamber in the housing, a valve rod in the chamber, a mixing chamber in the valve rod, a pair of chambers for containing fluids of different natures and communicating with the mixing chamber, an exit orifice in the mixing chamber, and means adjusting the degree of communication between said pair of chambers and the mixing chamber.

2. The device as recited in claim 1 wherein said valve rod is movable.

3. In a device of the class described, a housing, fuel and gas chambers therein, a mixing chamber, orifices in the walls of the fuel and gas chambers, orifices in the walls of the mixing chamber, certain of the last named orifices joining the mixing chamber with said fuel and gas chambers, the walls of the mixing chamber being relatively movable with respect to the fuel and gas chamber walls to vary the degree of communication between said joined orifices, and an exit orifice in a mixing chamber wall.

4. A device as recited in claim 3 wherein the mixing chamber is circular and rotatable within the housing.

5. In a device of the class described, a housing, a valve rod rotatable in the housing, an enclosed chamber in the valve rod, a plurality of orifices in the walls of said chamber, exit passages in the housing capable of alinement with certain of said orifices, means forming a fuel chamber, means forming a gas chamber, passages from each of the fuel and gas chambers capable of alinement with others of said orifices, and means to rotate the valve rod to vary the degree of alinement of the orifices and passages.

6. A device as recited in claim 3 including means to adjust the size of the exit orifice in the wall of the mixing chamber.

7. A device as recited in claim 3 wherein the fuel and gas orifices opening into the mixing chamber are generally opposed so that the fuel and gas impinge upon each other in a substantially head-on manner.

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