

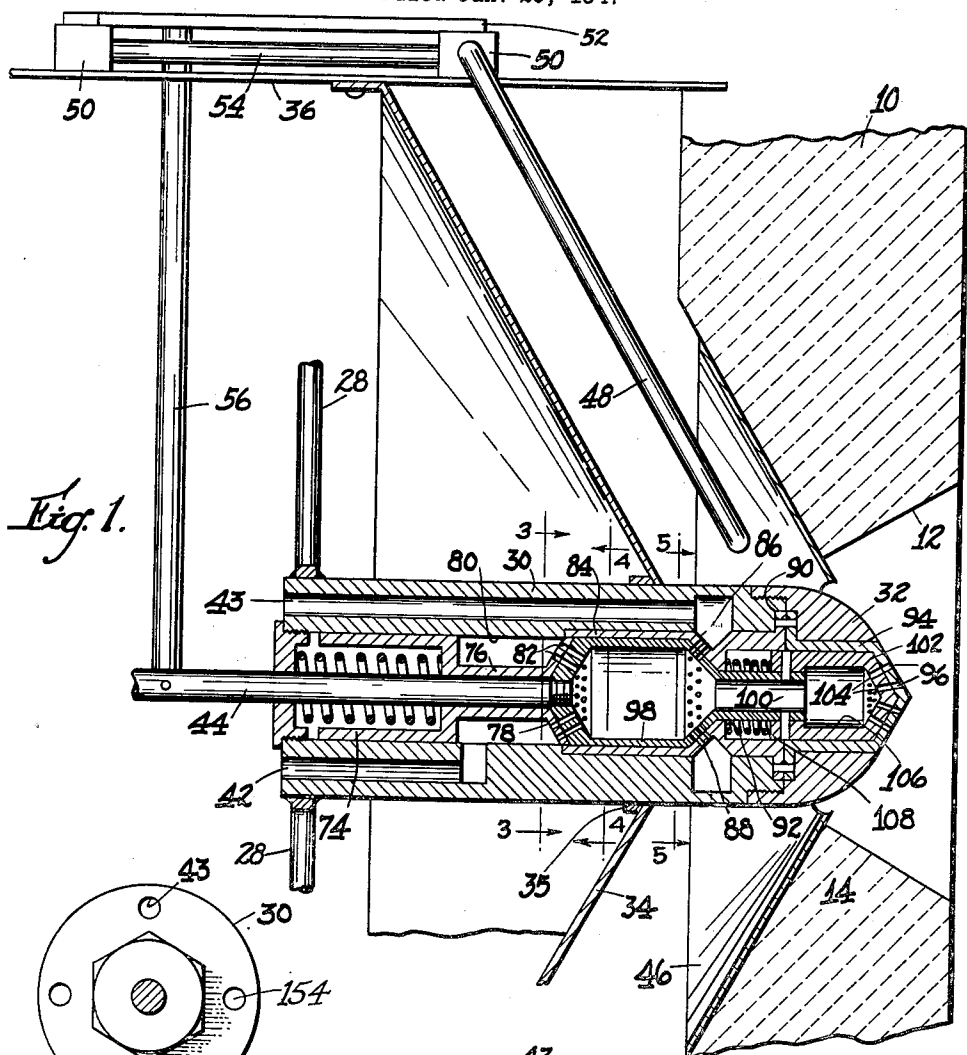
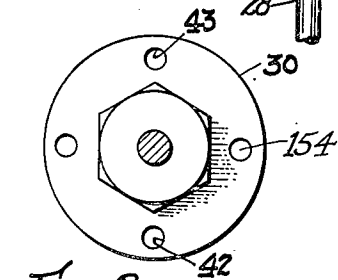
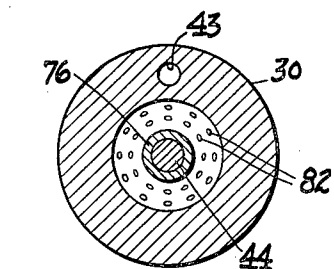
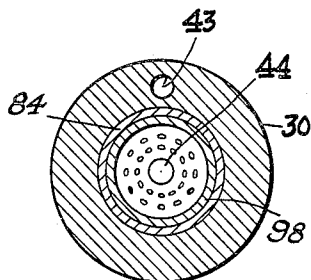
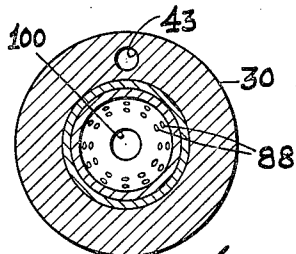
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FUEL BURNER

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FUEL BURNER

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5 Claims. (Cl. 299—140)

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This invention relates in general to fuel burner constructions and has particular reference to a construction for accurately adjusting atmospheric air in a fuel burner.

Objects of the invention include the provision of a novel fuel burner nozzle or carburetor the principal object of which resides in adjustable means to conduct a stream of gas, such as steam, air, oxygen, etc., into opposite and direct head-on collision with a stream of liquid fuel, such as a petroleum product, thus extremely finely dividing the fuel into minute drops forming a fog, so that the burnable material is in the form of a gas and may in fact be conducted for relatively long distances through piping before combustion takes place; and the provision of a device as above stated including a rarefaction chamber in which the collision takes place, said chamber being so constructed and arranged as to necessitate the fog passing through incoming streams of gas to reach exit orifices therefor, thus creating a still finer break down of the fuel.

Other objects of the invention include the provision of a fuel burner mounted in spaced relation to the walls of an opening in a furnace, said space providing means for the induction of atmospheric air into the furnace in the region of the flame, in combination with means for easily and simply varying the space to provide for a greater or less flow of atmospheric air, said means being in the form of an annulus which is adjustable to substantially close the space or gradually open the same and including a support for movement of the annulus to and from the above mentioned space; the provision of a device as above described including a fuel burning carburetor having means for mixing fuel and gas for the atomization of the former and means for adjusting the amount of flow of the fuel simultaneously with the adjustment of the atmospheric air; and the provision of cam means for accurately and simultaneously varying the flow of gas, fuel, and atmospheric air proportionately.

Further objects of the invention include the provision of a device of the class described in which the entire apparatus is mounted to swing on a plate secured to the furnace for opening and closing the same, the swinging parts being mounted on a pair of hinges on the plate, said hinges containing valve elements adjusting the fuel or gas.

Other objects and advantages of the invention will appear hereinafter.

Reference is to be had to the accompanying drawings in which

Fig. 1 is an enlarged section through the carburetor, and showing the relation thereof to adjacent parts, some parts being omitted for clarity;

Fig. 2 is a view of the rear end of the carburetor;

Figs. 3 to 5 inclusive are sections taken on the corresponding lines of Fig. 1.

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A furnace wall is shown at 10, this wall having a circular opening therethrough at 12, the opening having angular side wall edges as indicated at 14. Rods 28 support the carburetor housing 30 from any convenient member on the furnace wall.

The burner carburetor 30 is provided with a nozzle at 32 for directing atomized fuel to the interior of the furnace. A shield 34 in the form of a hollow truncated cone surrounds burner 30, being secured thereto as by a clamp band 35 and extending laterally from the shield are rods or plates 36. The burner carburetor 30 is provided with ports 42, 43 receiving pipes for the provision of the entrance of fuel and gas respectively, to the carburetor. The fuel and gas adjustment is controlled by a rotary valve rod 44. Slight rotation of rod 44 varies the fuel flow and gas from a shut-off condition to a maximum, as will become apparent hereinafter.

Shield 34 and the surface of the furnace opening are generally parallel and provide therebetween an atmospheric induction of air completely surrounding the carburetor and leading into the furnace. An annular shield 46 in the form of a hollow truncated cone is slidably mounted relative to the carburetor to approach or to be retracted from the similar surface occasioned by the shape of the furnace opening, and it will be seen that when shield 46 contacts the surface of the opening, the atmospheric air area to the furnace will be substantially reduced by maintaining the reduced air velocity at the nozzle, and that movement of the shield to the left in Fig. 1 will open the atmospheric air passage for greater volume of induced air to the flame.

Shield 46 is mounted on a pair of rods 48 in turn mounted on a frame comprising a pair of members 50, an inclined slotted connecting member 52, and a pair of rods 54 mounted to slide on one of the plates 36. Valve rod 44 is provided with a radial handle 56 which extends through the slot in member 52 and, therefore, handle 56 and rod 44 will be slightly rotated as the frame 50, 52 is moved to the right or left in Fig. 3. Thus it is seen that shield 46 and the valve rod 44 are operated simultaneously and proportionately, and the parts are arranged to reduce the induced atmospheric air upon the reduction of the fuel flow.

Referring now to Fig. 1, it will be seen that the carburetor 30 is hollow centrally thereof and is fitted at the rear end thereof with a sleeve 74 fixed therein and having a reduced portion 76 forming a bearing for the rotary valve rod 44. The sleeve continues forwardly from the reduced portion at a predetermined angle providing a wall as at 78 and forming a chamber 80 for liquid fuel entering through port 42. The wall 78 is apertured in a double circular row as at 82, see Fig. 7, the apertures forming inclined passages for the fuel from the chamber 80.

From wall 78, the sleeve extends along the interior of the carburetor as at 84 and enters a depression forming an inclined wall 86, also apertured in a double circular row as at 88, see Fig. 11, and thence extends forwardly terminating in a flange 90 and forming an internal shoulder 92. Bolted or otherwise secured to this flange, there is a flange of a hollow member 94 having a cone-shaped front end apertured in a double row as at 96, see Fig. 6.

It is to be understood that the entire sleeve and attached member 94 are fixed in the carburetor, and that valve rod 44 rotates with respect thereto as has already been described. Valve rod 44 is secured to a hollow member 98 having apertured, inclined end walls fitting walls 78 and 86, the respective apertures coinciding for full opening or being selectively diminished in total or combined area by turning the valve rod. The gas enters port 43 and passages formed by apertures 88 and those corresponding thereto in the member 98, and in the chamber formed by the latter, the fuel and gas meet in head-on collision to atomize the fuel. The chamber in member 98 will be referred to as the rarefaction chamber.

Member 98 continues forwardly within the sleeve above described, and forms a reduced passage 100 to the walls of which is pinned a hollow member 102 having a cone-shaped front end apertured to correspond with apertures 88 as at 104. Member 102 forms a relatively enlarged expansion chamber 106, a spring 108 bearing on shoulder 92 and on the rear end of member 102 tends to maintain the inclined surfaces in contact at the front of the carburetor.

Once the fuel and gas have been atomized in the rarefaction chamber, the resultant fog must pass through the incoming streams of gas to reach the passage 100, and this action still further reduces the size of the fuel particles. The fuel fog may expand in chamber 106 and then passes in a series of high pressure streams through the apertures 104 and 96 to the area of ignition. Clearly, a slight rotary motion of valve rod 44 adjusts the amount of incoming fuel, gas, and fuel fog simultaneously, and the apertures are arranged for proportional adjustment thereof, this adjustment being also proportional to the induced atmospheric air induction as explained above. Also the apertures are arranged to progress in their adjustment from a full closed position through a range of initial opening of a fraction of the apertures, to full opening of said fraction, then through an initial opening of more apertures, and so on until all apertures are completely open, thereby insuring positive and exact adjustments at all times.

Having thus 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 valve rod rotatable in the housing, a shell forming an enclosed chamber associated with and rotatable with the valve rod said shell being in the housing, a plurality of orifices in the walls of said shell, exit passages in the housing for alinement or selective misalinement with certain of said orifices as the shell is rotated, means forming a fuel chamber in the housing, means forming a gas chamber in the housing, passages from each of the fuel and gas chambers positioned for alinement with others of said orifices in the shell, and means external of the housing to rotate the valve

rod and shell to vary the degree of alinement of the orifices and passages.

2. The device of claim 1 wherein the passages and orifices are arranged to be varied in proportion to each other.

3. In a device of the class described, a housing, means in the housing forming a walled rarefaction chamber therein, means in the housing forming a walled expansion chamber, a first passage joining the two chambers for communication therebetween, inlet passages leading through the walls of the rarefaction chamber, certain of said inlet passages being located closely adjacent the first passage and the remainder of the inlet passages being located in the wall of the rarefaction chamber opposite the first passage, said inlet passages being oppositely inclined toward each other for directing fluids into the rarefaction chamber in opposite directions for head-on impingement and consequent rarefaction and turbulence thereof, said rarefied fluids entering the expansion chamber through the first passage and passing through the jets of fluid entering the rarefaction chamber through those inlet passages which are adjacent said first passage, and exit orifices in a wall of the expansion chamber.

4. The device of claim 3 wherein the walls of the rarefaction chamber form a shell movable relative to the housing and including further chambers for the fluids, fixed perforated walls in relative sliding contactual relation with the walls of the shell containing the inlet passages, said fixed perforated walls forming parts of the respective further chambers, means to move the shell, the perforations and inlet passages registering at a predetermined position of the shell, and the movement thereof varying such registration to vary the fluid flow into the rarefaction chamber.

5. The device of claim 3 wherein the walls of the rarefaction chamber form a shell movable relative to the housing and including further chambers for the fluids, fixed perforated walls in relative sliding contactual relation with the walls of the shell containing the inlet passages, said fixed perforated walls forming parts of the respective further chambers, means to move the shell, the perforations and inlet passages registering at a predetermined position of the shell, and the movement thereof varying such registration to vary the fluid flow into the rarefaction chamber, a fixed perforated plate the perforations of which are in registry with the exit orifices of the expansion chamber, and means connecting the walls of the latter to the shell for simultaneous movement thereof for variation of the exit orifices, the latter variation being proportional to the degree of registration of the inlet passages.

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