

Jan. 3, 1950

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2,493,474

GENERATOR BURNER WITH SNAP ACTION CONTROL

Filed May 8, 1944

Fig. 1

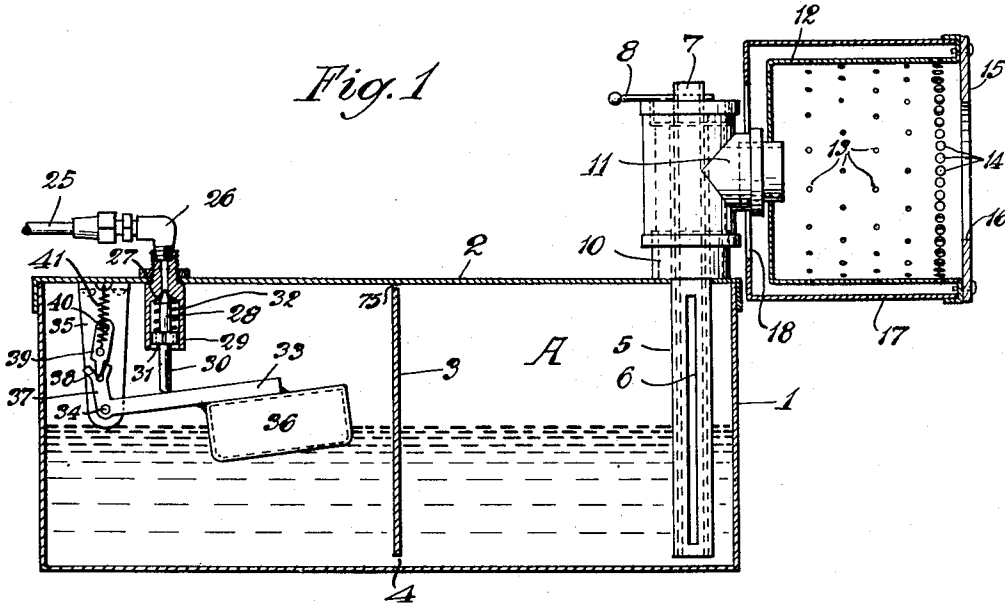


Fig. 2

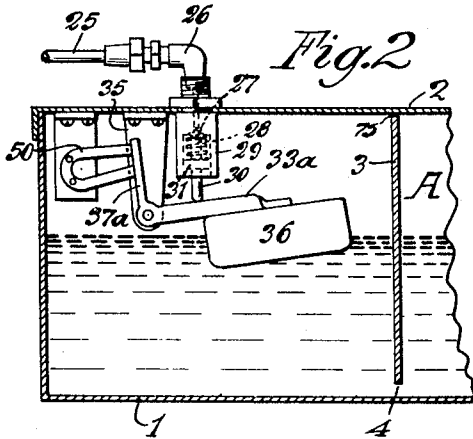


Fig. 3

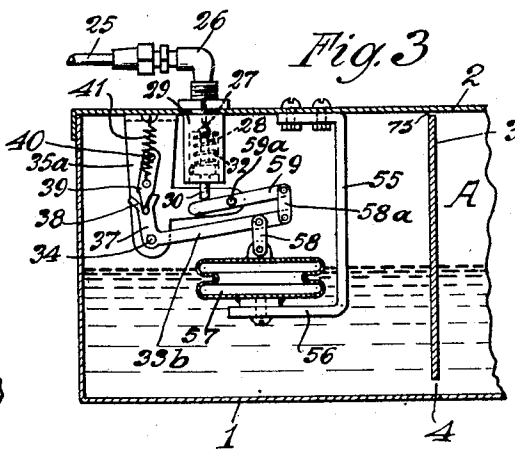
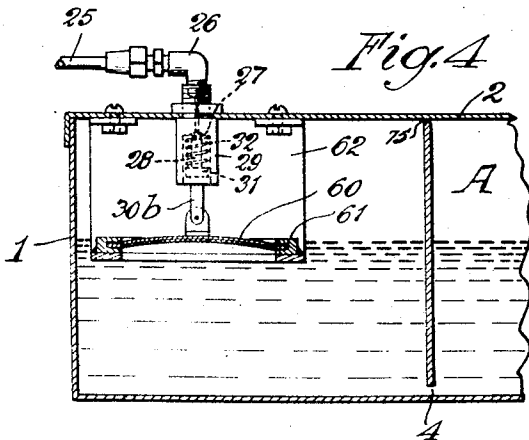


Fig. 4



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UNITED STATES PATENT OFFICE

2,493,474

GENERATOR BURNER WITH SNAP ACTION CONTROL

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Application May 8, 1944, Serial No. 534,558

7 Claims. (Cl. 158—38)

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My invention relates to an improvement in generator type burners and has for one purpose to provide improved means for controlling the fuel supply to such burners.

Another purpose is to provide improved means for controlling the fuel supply to burners in general, where it is desired to maintain a storage or fuel supply member separate from but connected to a main source of liquid fuel supply.

Another purpose is to provide means for varying the flow of liquid fuel from a supply container to a receiving container in response to variations in the level of the liquid fuel in the receiving container.

Another purpose is to provide an improved float chamber for liquid fuel burners.

Another purpose is to provide an improved float chamber and float controlled operating means for the supply valves controlling the flow of liquid to a tank.

Another purpose is to provide improved means for obtaining a quick or snap action of a movable valve member controlling the inflow of liquid to a tank.

Other purposes will appear from time to time in the course of the specification and claims.

I illustrate my invention more or less diagrammatically in the accompanying drawings, in which:

Fig. 1 is a vertical section;

Figs. 2, 3 and 4 are partial vertical sections through variant forms of my invention.

Like parts are indicated by like symbols throughout the specification and drawings.

My invention has been shown as applying to a generator type burner, but it will be understood that while this may be a preferred use, my invention is also applicable to other types of burners or to tanks for the storage or dispensation of liquids other than liquid fuels.

Referring first to Fig. 1:

1 generally indicates a tank having a cover 2 and an intermediate wall 3 dividing the tank into two separate spaces which are connected by any suitable clearance or aperture 4. The right-hand tank, as shown at A, constitutes a generator chamber for a generator type burner. I illustrate, for example, an outer air tube 5 having longitudinal slots 6, and an inner air tube 7 which is provided with slots, not shown in detail, and which may be rotated by the handle 8. The tubes 5 and 7 are open at the top and air may flow downwardly through the tube 7 and inwardly through the slots 6 to a generator space A. It will be understood that the tubes 5 and 7 together constitute a shutter mechanism for admitting a variable supply of air to the interior of the generator chamber.

In generator burners of this type, a generator flame or fire is maintained in the generator cham-

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ber and serves to vaporize liquid fuel which is burned in the burner, which will later be described. In the mechanism of Fig. 1, the vaporized liquid fuel rises upwardly through the pipe 10, which surrounds the upward extension of the air inlet tubes 5 and 7. It passes thence through the arm 11 to the interior of the horizontally axised pot 12. The pot 12 is shown as having a plurality of primary air inlets 13 located at various distances from the closed bottom or end of the pot. Adjacent the open end of the pot is a single row of secondary air inlet apertures 14. The otherwise open end of the pot is partially closed by the ring 15, with its central aperture 16. 17 indicates an outer skirt or housing having a large inlet aperture 18, through which the fuel inlet arm 11 extends.

After vaporizing combustion has been initiated in the generator or vaporizing chamber A, the vaporized fuel flows into the pot 12, where it receives primary air through the apertures 13. The mixture of air and vaporized fuel thus formed receives its secondary air supply through air inlets 14, and at the high fire stage burns near the secondary air inlets 14 and the flame ring aperture 16. The rate of combustion is controlled by controlling the rate of vaporization. This, in turn, is controlled by controlling the rate of inflow of air downwardly along the tube 7 and through the slots 6.

The length of the slot 6 permits my burner to operate through a wide fluctuation in the level of the fuel within the tank 1. However, it is desirable to limit this fluctuation to a reasonably small range. A liquid fuel is supplied to the tank 1 along the fuel pipe 25, which, through an angle fitting 26, delivers fuel downwardly past a valve seat 27 and a movable valve member 28. The valve fitting includes a downwardly open cylinder 29. The valve member 28 has a downwardly extending plunger 30 and a spring abutment 31. The spring 32 is compressed between the abutment 31 and the valve fitting adjacent or surrounding the valve seat 27. The plunger 30 is adapted to abut against the float lever 33, pivoted, as at 34, to any suitable bracket 35. 36 indicates a float adapted to control the movement of the lever 33, and thus to control the position of the valve stem or plunger 30, the lever 33 has a bell crank lever arm 37, which is shown as notched, as at 38, and is in a toggle relationship with the arm 39 which is pivoted, as at 40, to the bracket 35. 41 is a spring which tends to hold the arm 39 over center. In use, when the parts are in the position as shown in Fig. 1, the float 36 is effective to hold the valve in the closed position in which it is shown. As the level of the fuel drops, the float 36 will tend to fall with it. However, the toggle structure shown will for a time keep it in the position in which it is shown in Fig. 1. When

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the level of the fuel falls sufficiently for the weight of the lever 33 and the float 36 to overcome the spring 41, then the lever 33 and the float 36 will drop until the float is again supported on the liquid fuel. The position which the lever 33 will drop to will be sufficiently lower than the position in which the parts are shown in Fig. 1 to leave the valve stem or plunger 30 a substantial distance in which to move. The spring 32 will then move the valve 28 to wide-open position and more fuel will flow along the pipe 25. However, meanwhile the toggle structure will have moved to the opposite side of center, and the float 36 will not at first overcome the force of the spring 41. When finally the level of the fuel is high enough to throw the lever 37 over center, there will be a sharp upward movement of the lever 33, which will drive the valve 28 back to the fully closed position. I thus provide an effective snap action control for opening and closing the valve, to admit or cut off the supply of liquid fuel to the tank 1.

In Figure 2 I illustrate a similar structure save that in the place of the toggle mechanism of Figure 1, I employ a permanent magnet 50, opposed to the arm 37a of the lever 33a. I thus obtain a snap action at the opening of the valve, because the pull of the magnet 50 has to be overcome. I also obtain a snap action in the closing of the valve, because when the arm 37a approaches the magnet 50, its final movement will be a sharp movement in response to magnetic pull.

In the form of Figure 3 I employ, basically, the structure of Figure 1, but I substitute a heat responsive bellows for the float. I indicate a bracket 55 on the lower arm 56 of which is positioned the thin walled bellows 57, which is connected by a link 58 to the lever arm 33b. A link 58a connects the lever 33b and a valve actuating lever 59 pivoted as at 59a to an extension of the bracket 35a. It will be understood that generating combustion is taking place in the chamber A. As the level of the fuel drops, the bellows 57 becomes increasingly subjected to the heat of said combustion. The bellows, therefore, expands and is shown in Figure 3 in expanded position. In response to its expansion the lever 33b is moved upwardly and rocks the valve actuating lever 59 about its pivot, thus moving the valve stem 30 to open position.

The form of Figure 4 resembles the form of Figure 3, in that a heat responsive member is employed. I illustrate, for example, a snap disc member 60, which is slightly concave or convex, and which shifts in response to temperature changes. I illustrate it as positioned in a circumferential abutment 61 supported on any suitable bracket structure 62. When the level of the liquid covers the member 61 and is protected from the heat of combustion in the generator chamber A, it is in the valve closing position, controlling the valve by maintaining an upward thrust against the valve stem 30b. When the level drops and the member 60 is subjected to the heat of combustion, it snaps downwardly and sharply withdraws the valve stem 30b to the valve opening position. As the member 60 will always move with a snap action, I thus provide an efficient snap action control for actuating the fuel inlet valve.

It will be realized that whereas I have described a practical and operative device, nevertheless many changes may be made in the size, shape, number and disposition of parts without departing from the spirit of my invention. I therefore wish my drawings and description to be taken as in a broad sense illustrative or diagrammatic

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rather than as limiting me to my specific disclosure. There is a slight clearance 75 between the cover 2 and partition wall 3 in each form of device. That clearance is sufficient to permit air and gas passage and equalize the pressure in the generator chamber and in the chamber in which the control mechanism is mounted.

The use and operation of my invention are as follows:

In generator type burners, a generator tank or container is employed in which a generating flame or combustion is maintained to vaporize liquid fuel which passes to a zone of combustion after being mixed with sufficient air to form a fully combustible mixture. It may be convenient and efficient to employ a generator chamber of sufficient size to hold liquid fuel sufficient for a relatively long operation of the burner. Under some circumstances, however, it is advantageous to connect the generator chamber with a remote source of liquid fuel and to provide means for maintaining an adequate supply of liquid fuel in the generator chamber. I therefore illustrate a generator chamber element 1, with an intermediate partition 3, which divides the chamber into a generator portion and a float chamber portion. A substantial fluctuation of level is permitted, but the float or control structure shown in the various drawings, attached hereto, provide means for causing the supply of additional fuel when the level of fuel in the tank approaches the low side, while shutting off the additional supply of fuel when the level in the tank reaches a predetermined height.

Referring to Fig. 1, I illustrate a simple float which, as it raises and lowers, moves the valve member 28 out of or into closed position. In order to insure a snap action, which tends to prevent sticking of the valve, I provide a toggle structure as shown in Fig. 1. In Fig. 2 I obtain a similar snap action by employing the permanent magnet 50. In Fig. 3, I substitute a heat responsive bellows for the floats shown in Figs. 1 and 2, and in Fig. 4 I employ a heat responsive bimetallic concavo-convex warping member. In all forms of the device I illustrate a valve control compartment associated with the generator chamber and employing variations in the level of the fuel in the generator chamber to control the inflow of liquid fuel.

Where I have shown my invention as applied to a generator type burner, it will be understood that my snap action means may be employed in connection with a wide variety of uses where a liquid is to be intermittently supplied to a tank in order to compensate for the removal of the contents of the tank.

I claim:

1. In a fuel supply tank system for vaporizing type burners, a vaporizing chamber, an air inlet duct extending from the upper portion of the chamber downwardly below the level of fuel in said chamber, a vapor outlet therefor, a fuel inlet chamber, a fuel inlet duct extending thereto, partition means between the two chambers adapted and disposed to permit air communication between the two chambers above the level of the fuel therein, and to maintain liquid communication between the two chambers while shielding the liquid fuel in the fuel inlet chamber from generating combustion taking place in the vaporizing chamber, a movable valve member mounted in the fuel inlet and controlling the flow of fuel to the fuel inlet chamber, and means responsive to variation in the common level of

the liquid fuel in the two chambers for moving said valve member.

2. In a fuel supply tank system for vaporizing type burners, a vaporizing chamber, an air inlet duct extending from the upper portion of the chamber downwardly below the level of fuel in said chamber, a vapor outlet therefor, a fuel inlet chamber, a fuel inlet duct extending thereto, partition means between the two chambers adapted and disposed to permit air communication between the two chambers above the level of the fuel therein, and to maintain liquid communication between the two chambers while shielding the liquid fuel in the fuel inlet chamber from generating combustion taking place in the vaporizing chamber, a movable valve member mounted in the fuel inlet and controlling the flow of fuel to the fuel inlet chamber, means responsive to variation in the common level of the liquid fuel in the two chambers for moving said valve member, and means for imparting a snap action to said valve member, between fully opened and fully closed position.

3. In a fuel supply tank system for vaporizing type burners, a vaporizing chamber, an air inlet duct extending from the upper portion of the chamber downwardly below the level of fuel in said chamber, a vapor outlet therefor, a fuel inlet chamber, a fuel inlet duct extending thereto, partition means between the two chambers adapted and disposed to permit air communication between the two chambers above the level of the fuel therein, and to maintain liquid communication between the two chambers while shielding the liquid fuel in the fuel inlet chamber from generating combustion taking place in the vaporizing chamber, a movable valve member mounted in the fuel inlet and controlling the flow of fuel to the fuel inlet chamber, means responsive to variation in the common level of the liquid fuel in the two chambers for moving said valve member, and means for imparting a snap action to said valve member, between fully opened and fully closed position, said means including a permanent magnet, and a metal part opposed thereto.

4. In a fuel supply means for burners of the vaporizing type, a vaporizing chamber adapted to receive and contain a supply of fuel for vaporization, and having a vapor outlet, a fuel receiving chamber, in communication with the vaporizing chamber, adapted to receive and contain a supply of liquid fuel having a common level with the liquid fuel in the vaporizing chamber, means for delivering liquid fuel to the fuel receiving chamber, including a supply duct and a movable valve member therefor, and means responsive to variations in the level of the liquid in the two chambers, for moving said valve member into and out of closed position the vapor outlet furnishing the sole path for discharge of fuel from the generator chamber.

5. In a fuel supply means for burners of the vaporizing type, a vaporizing chamber adapted to receive and contain a supply of fuel for vaporization, and having a vapor outlet, a fuel receiving chamber, in communication with the vaporizing chamber, adapted to receive and contain a supply of liquid fuel having a common level with the liquid fuel in the vaporizing chamber, means for delivering liquid fuel to the fuel receiving chamber, including a supply duct and a movable valve member therefor, and means responsive to variations in the level of the liquid in the two

chambers, for moving said valve member into and out of closed position, including a float member positioned in the fuel inlet chamber the vapor outlet furnishing the sole path for discharge of fuel from the generator chamber.

6. In a fuel supply means for burners of the vaporizing type, a vaporizing chamber adapted to receive and contain a supply of fuel for vaporization, and having a vapor outlet, and a fuel receiving chamber, in communication with the vaporizing chamber, adapted to receive and contain a supply of liquid fuel having a common level with the liquid fuel in the vaporizing chamber, means for delivering liquid fuel to the fuel receiving chamber, including a supply duct and a movable valve member therefor, and means responsive to variations in the level of the liquid in the two chambers, for moving said valve member into and out of closed position, including means for imparting a snap action to said valve member, between fully opened and fully closed position the vapor outlet furnishing the sole path for discharge of fuel from the generator chamber.

7. In a fuel supply means for burners of the vaporizing type, a vaporizing chamber adapted to receive and contain a supply of fuel for vaporization and having a vapor outlet, a fuel receiving chamber, in communication with the vaporizing chamber, adapted to receive and contain a supply of liquid fuel having a common level with the liquid fuel in the vaporizing chamber, means for delivering liquid fuel to the fuel receiving chamber, including a supply duct and a movable valve member therefor, and means responsive to variations in the level of the liquid in the two chambers, for moving said valve member into and out of closed position, including a float member positioned in the fuel inlet chamber, and means for imparting a snap action to said valve member, between fully opened and fully closed position, in response to raising or lowering of the float member the vapor outlet furnishing the sole path for discharge of fuel from the generator chamber.

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