Aug. 19, 1941. H. M. ULLSTRAND 2,253,056

LIQUID FUEL BURNER

Filed Oct. 5, 1937

Fig. 1.

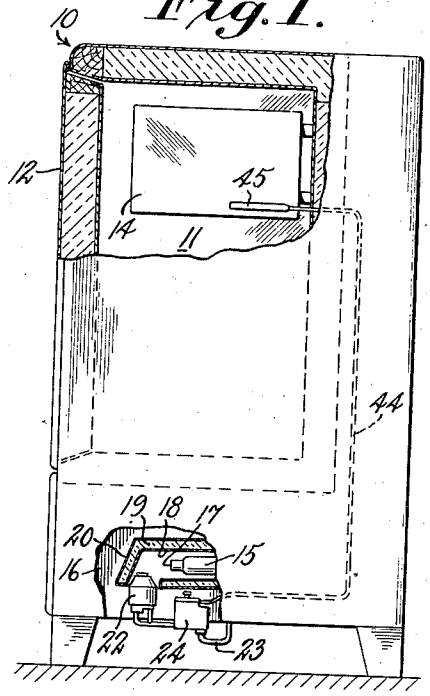
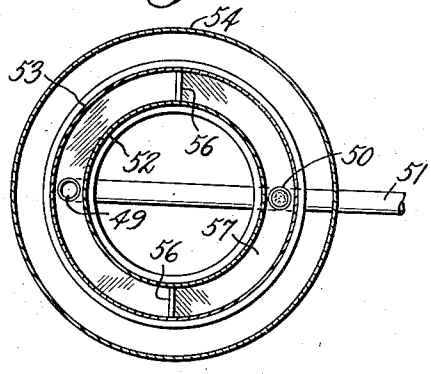


Fig. 3.



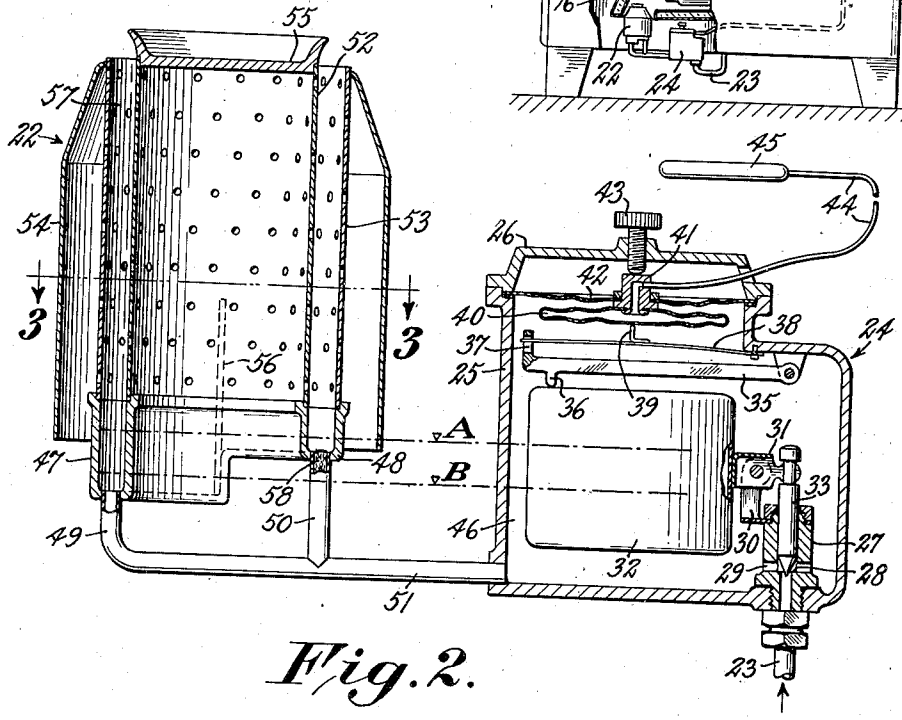


Fig. 2.

INVENTOR.
Hugo M. Ullstrand

BY

Ell Fernander his ATTORNEY.

Patented Aug. 19, 1941 2,253,056

UNITED STATES PATENT OFFICE

2,253,056

LIQUID FUEL BURNER

Hugo M. Ullstrand, Evansville, Ind., assignor to Servel, Inc., New York, N. Y., a corporation of Delaware

Application October 5, 1937, Serial No. 167,349

1 Claim. (Cl. 158—87)

My invention relates to a liquid fuel burner and more particularly to a liquid fuel burner for a continuous absorption refrigerator, and has for its object to provide an improved burner particularly adapted for automatic regulation.

The above and other objects and advantages of the invention will become apparent from the following description taken in connection with the accompanying drawing forming a part of this specification, and of which:

Fig. 1 is a view in elevation, partly broken away and in section, of a refrigerator embodying the invention;

Fig. 2 is an enlarged vertical sectional view of the burner shown in Fig. 1; and

Fig. 3 is a sectional view taken on line 3—3 of Fig. 2.

Referring to Fig. 1, I have shown my invention in connection with a refrigerator comprising a cabinet 10 having a thermally insulated storage compartment 11 into which access may be had by a door 12 hinged to the front of the cabinet. The storage compartment 11 is kept at a desired low temperature by a cooling element 14. The cooling element 14 forms a part of an absorption refrigeration apparatus unit of the type described in Patent No. 2,037,782 to William R. Hainsworth.

The absorption refrigeration unit is mounted in the cabinet 10 and includes a generator having a horizontal portion 15 located in an apparatus compartment 16 below the storage compartment 11. The horizontal portion 15 of the generator includes an inner heating flue 17 and an outer heating flue 18. The outer heating flue 18 is embedded in suitable heat insulating material 19 retained in a shell or casing 20. The forward end of the heating flue 18 is provided with an opening to receive the upper end of a burner 22. Liquid fuel, such as kerosene, for example, is supplied from a storage tank (not shown) through a conduit 23 and a liquid level control 24 to burner 22.

The liquid level control 24 is generally of the type described in Patent No. 2,069,857 to Harry C. Shagaloff and includes a casing 25 having a removable cover 26. A vertical sleeve 27 located in casing 25 is threadedly secured at its lower end in an opening to which conduit 23 is connected. A valve seat 28 is formed at the lower end of sleeve 27 and above this valve seat are located a plurality of openings 29. To the sleeve 27 is secured a bracket 30 having pivotally mounted thereon an arm 31 of a float 32. The arm 31 is provided with rounded bifurcated ends which fit about a reduced portion of a needle valve 33 which is vertically movable in sleeve 27.

Within casing 25 is pivoted a lever 35 which overlies the float 32. The lever 35 is formed with a downwardly extending projection 36 which is adapted to rest on the float 32, whereby the weight of lever 35 may be added to the weight of the float. The outer end of lever 35 is bent upward and provided with an opening 37 to receive the outer end of a resilient leaf-spring 38 which is secured at its other end to a wall of casing 25. The spring 38 normally tends to move lever 35 upward whereby the lever 35 is removed from the float 32.

The spring 38 is provided with an upward extension 39 which is adapted to contact and bear against an expansible diaphragm 40. The diaphragm 40 is secured to a hollow hub member 41 which in turn is fixed in an opening in a resilient diaphragm 42. The diaphragm 42 is secured between the upper end of casing 25 and the removable cover 26 and is adjustable by an adjustment screw 43 extending through the cover 26. The expansible diaphragm 40 is connected by a capillary tube 44 to a bulb 45 which, as shown in Fig. 1, is arranged in thermal exchange relation with the cooling element 14 of the refrigeration apparatus. The expansible diaphragm 40, capillary tube 44, and bulb 45 constitute an expansible fluid thermostat which is charged with a suitable volatile fluid that increases and decreases in volume with corresponding changes in temperature.

When the temperature of cooling element 14 increases and the expansible diaphragm 40 expands sufficiently, the spring 38 is moved downwardly such a distance that lever 35 is permitted to rest upon the float 32. With the weight of lever 35 added to that of the float 32, the weighted float 32 closes the valve 33 when liquid in the float chamber 46 is at the level indicated at A. When the temperature of cooling element 14 decreases and the expansible diaphragm 40 contracts sufficiently, the spring 38 moves up and raises lever 35 from the float 32. With the weight of lever 35 removed from float 32, the needle valve 33 will remain closed until the liquid level in the float chamber 46 reaches a level indicated at B.

In accordance with my invention, I provide the burner 22 which is constructed and arranged for efficient operation with a liquid level control of the character just described. The burner 22 includes a burner well having one half 47 of greater depth than the other half 48. The portions

47 and 48 of the burner well are connected by burner tubes 49 and 50 and conduit 51 to the lower part of the float chamber 46.

A pair of spaced perforated chimneys 52 and 53 extend upward from the upper end of the burner well, and about the chimneys is provided an enclosing shell 54. The upper end of the inner chimney 52 is closed by a cap 55. At the juncture of the portions 47 and 48 of the burner well partitions 56 extend upward for a short distance in the annular space 57 formed by the chimneys 52 and 53.

When operation of the burner 22 is started, liquid fuel flows through the supply conduit 23 past the needle valve 33 into float chamber 46. Assuming that the expansible diaphragm 40 has expanded sufficiently to permit lever 35 to rest on the float 32, liquid flows from float chamber 46 through conduit 51 and burner tubes 49 and 50 into both portions 47 and 48 of the burner well until the level indicated at A is reached. Upon starting the burner 22, the refrigeration apparatus is heated with what may be referred to as a maximum flame. The liquid fuel is maintained at a high level by the liquid level control 24, and vaporization of liquid takes place within both portions 47 and 48 of the burner well.

When the temperature of the cooling element 14 reaches a predetermined low temperature, the expansible diaphragm 40 contracts sufficiently, as described above, to permit spring 38 to remove lever 35 from the float 32, whereby the liquid level recedes towards the lower level indicated at B.

The burner flame becomes smaller as the liquid level becomes lower, and, when the liquid is at the lower level, vaporization of liquid is effected about the portion 47 of the burner well. Since vapor is produced in only about half the burner well with liquid at the lower level, the refrigeration apparatus is heated under these conditions with what may be referred to as a minimum flame. By providing the partitions 56 to divide the annular space 57, the flame is restricted to approximately half-way about the chimneys 52 and 53, so that a relatively small flame is produced with liquid at the lower level. In order to accelerate the ignition of liquid in the portion 48 of the burner well when liquid rises to the higher level, a wick 58 may be provided at the upper end of burner tube 50.

While I have shown and described a particular embodiment of the invention, I do not wish to be limited to the particular arrangement set forth, and I therefore aim in the following claim to cover all modifications and changes that fall within the true spirit and scope of the invention.

What is claimed is:

In a liquid fuel burner, an annular vaporizing well having two parts, an annular combustion chimney on said vaporizing well, a liquid level control device having a connection to each part of said well, one part of said well being shallower than the other part so that when a certain high liquid level is maintained by said control device, liquid is contained in and vaporizes in both parts, but when a certain low liquid level is maintained by said device, liquid is contained in and vaporizes in only the deeper of said parts, and partition walls separating said well parts and extending upward into said chimney so that when vaporization takes place in only one part the flame is restricted to substantially only that part of the chimney above said well part in which vaporization occurs.

HUGO M. ULLSTRAND.