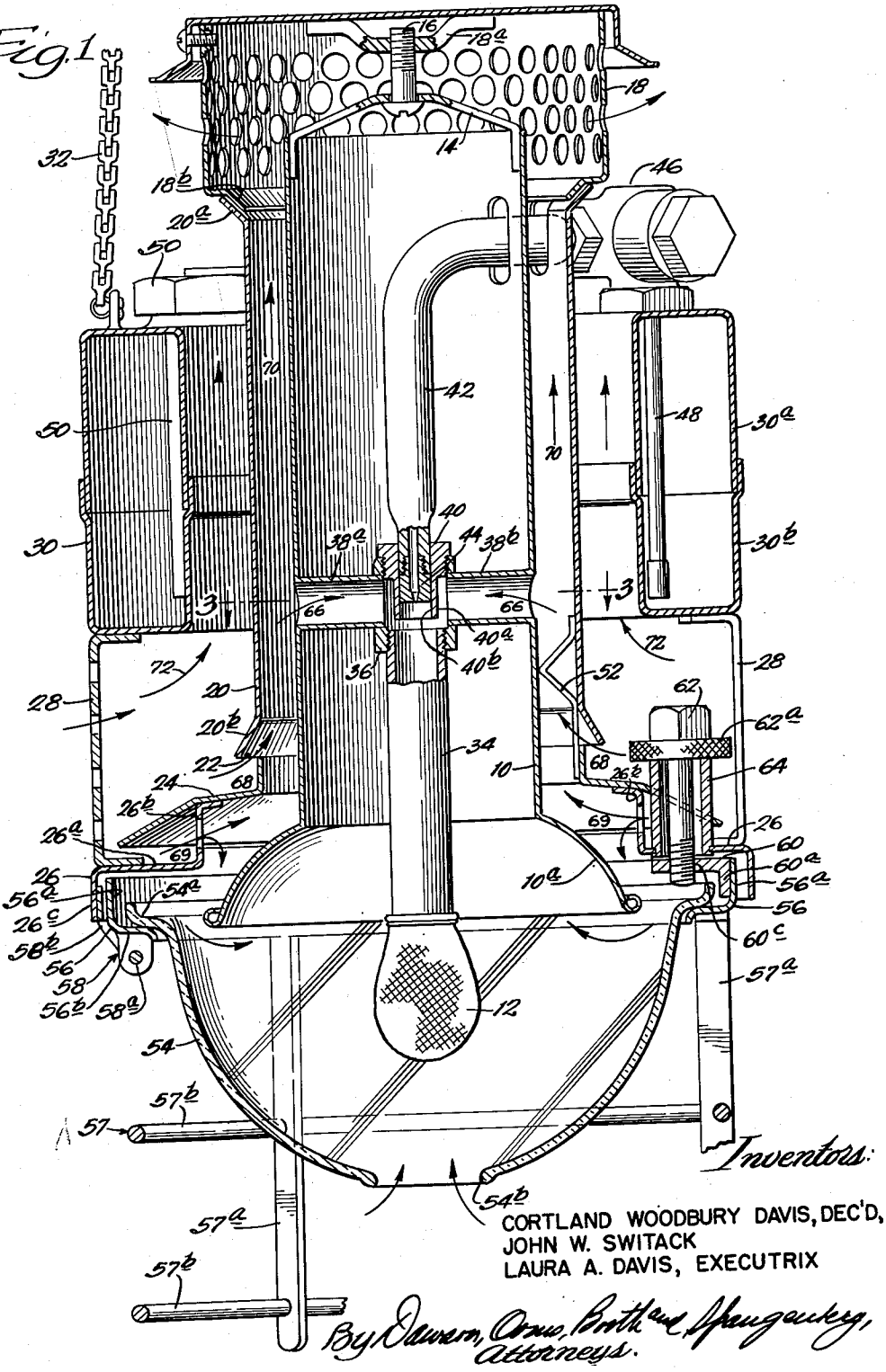
Dec. 2, 1952 C. W. DAVIS ET AL 2,619,820

INVERTED INCANDESCENT MANTLE LANTERN

Filed July 9, 1949 2 SHEETS—SHEET 1

Fig. 1



Inventors:

CORTLAND WOODBURY DAVIS, DEC'D,
JOHN W. SWITACK
LAURA A. DAVIS, EXECUTRIX

By Dawson, Orrio, Brothers & Spangenberg,
Attorneys.

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Fig. 2

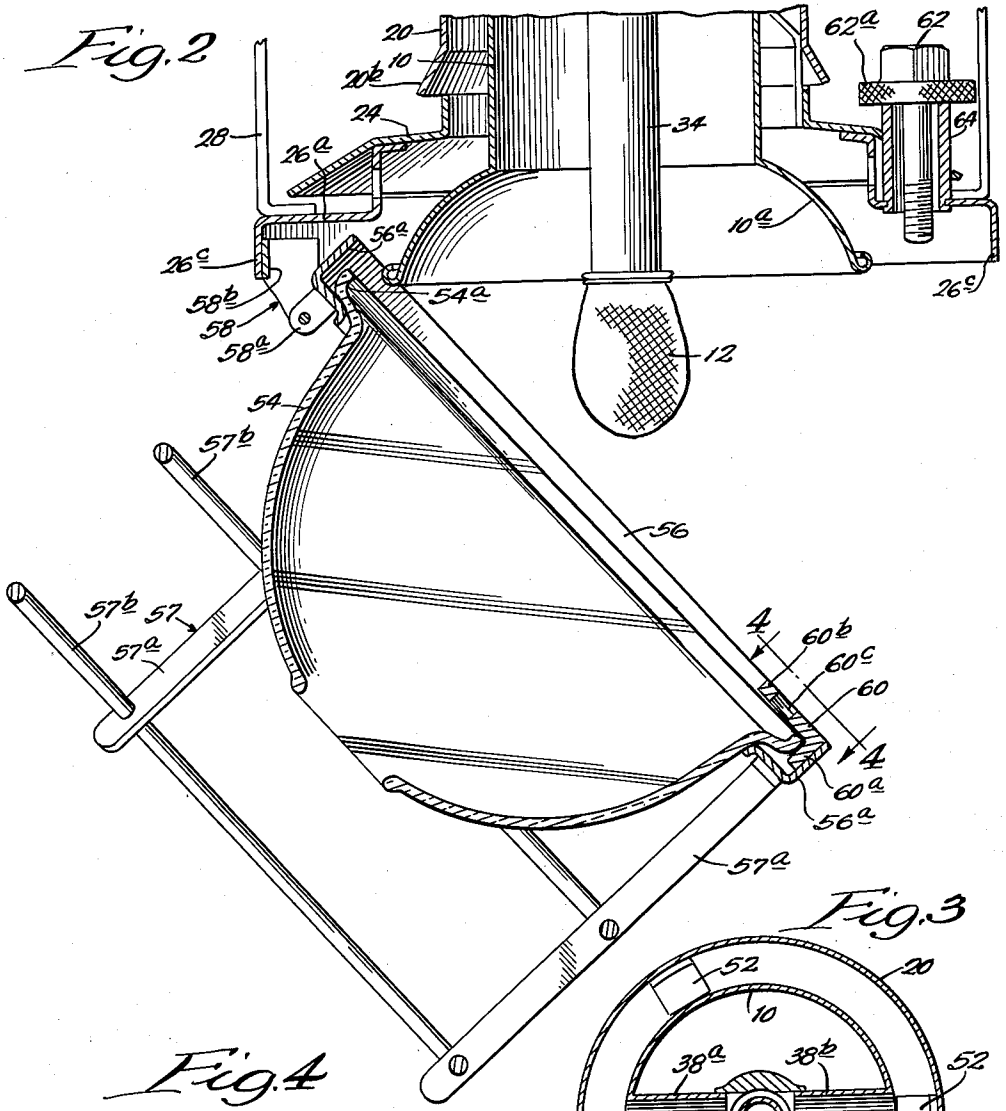


Fig. 3

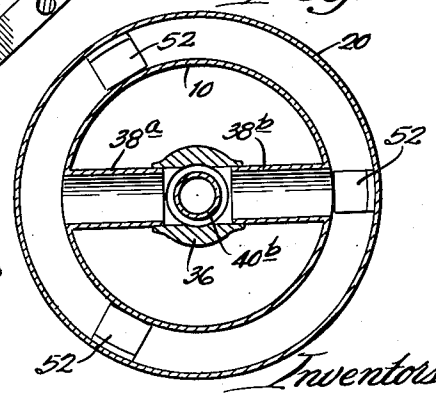
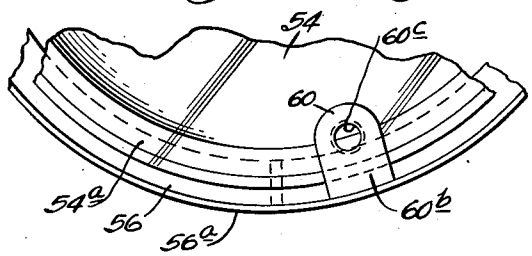


Fig. 4



Inventors:

CORTLAND WOODBURY DAVIS, DEC'D,
JOHN W. SWITACK
LAURA A. DAVIS, EXECUTRIX

By Dawson, Orrick, Booth and Spangenberg,
Attorneys.

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UNITED STATES PATENT OFFICE

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INVERTED INCANDESCENT MANTLE LANTERN

Cortland Woodbury Davis, deceased, late of River Forest, Ill., by Laura A. Davis, executrix, River Forest, Ill., and John W. Switack, Nashville, Tenn., assignors to Aladdin Industries, Incorporated, Chicago, Ill., a corporation of Illinois

Application July 9, 1949, Serial No. 103,884

4 Claims. (Cl. 67—50)

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Incandescent mantle lantern

Our invention relates to an improved compact and safe inverted incandescent mantle lantern for burning hydrocarbon fuel under pressure, which is portable and adapted to withstand rough handling.

It is a particular object of the invention to provide a safe lantern of the type in which a large part of the path of the light is unobstructed and which is capable of radiating light downwardly as well as radially. It is a further object of the invention to provide a lantern which, besides being ruggedly constructed for heavy duty, is compact and of minimum overall dimensions, while at the same time having an operating capacity of eight or nine hours with the tank completely filled.

It is still a further object of the invention to provide a lantern which, besides meeting the foregoing requirements, will operate satisfactorily in temperatures as low as 65° F. and as high as 125° F. and under adverse weather conditions.

It is obvious that the requirement of obtaining maximum light radiation makes it necessary to place the fuel tank of such a lantern above the source of light, as a fuel tank, as used in standard lanterns, below the light source obstructs the downward path of light. While lanterns having the fuel tank above the light source are known, such lanterns are usually of large size and for stationary use.

With a lantern of large size, it is not difficult to provide optimum conditions for satisfactory operation of a lantern. However, if it is desired to provide a compact device which is restricted as to size, the serious problem arises of keeping the fuel tank sufficiently cool.

The present invention offers a solution of the aforementioned problems and meets the requirements, as to safety, compactness, sturdiness and maximum light output and radiation.

Another object of the present invention is to provide an improved lantern for burning hydrocarbon fuel under pressure wherein the generator is shielded against excessive heat.

In accordance with the present invention the lantern is formed with an inner chimney through which the heated products of combustion travel. An outer chimney encircles the inner chimney and is open at its lower end to admit fresh air. The fuel is contained in a toroidal tank of rectangular cross-section in spaced relation with the outer chimney. As a result, the tank in itself acts as a further chimney for circulation of air upwardly which aids to cool the tank as well

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as the outer chimney. This construction permits the tank to be placed relatively close to the outer chimney to provide a compact lantern and at the same time it prevents overheating of the fuel tank.

Further in accordance with the present invention, the means for supplying outer air to the fuel mixing tube comprises a pair of tubes extending radially of the chimney in opposite direction, each tube being rigidly secured at one end and terminating in an orifice provided in the inner chimney. In as much as the inner chimney is surrounded by the outer chimney, the orifices are protected against heavy drafts, thus shielding the air inlet and providing a continuous and steady air supply to the fuel mixing chamber which contributes to the even burning of the flame. Moreover, the air supplied to the air tubes is clean outer air, completely uncontaminated by products of combustion.

Moreover, the transparent globe which protects the mantle is held in by its upper flange in a ring hingedly supported from the lantern structure. This ring receives a lug at a point opposite the hinge means which overlays the flange to secure the globe in position even if the globe is swung to the open position. This lug has a threaded opening which receives a mating bolt in the lantern releasably to hold the globe in the closed position. In this fashion the lantern is protected against accidental dropping of the globe and at the same time the globe is easily replaced and simple access to the mantle is provided. The bolt is of a length such that when it is moved upwardly it abuts against the lower tank structure so that it cannot be removed, and thus cannot be lost or misplaced.

The novel features which we believe to be characteristic of our invention are set forth with particularity in the appended claims. Our invention itself, however, both as to its organization and method of operation, may best be understood by reference to the following description taken in connection with the accompanying drawings in which:

Figure 1 is an axial cross-sectional view with parts in elevation of an inverted lantern of the pressure type constructed in accordance with the principles of the present invention;

Figure 2 is a fragmentary view like Figure 1 but showing the globe in the open position;

Figure 3 is a fragmentary cross-sectional view through the axis 3—3, Figure 1;

Figure 4 is a fragmentary cross-sectional view through the axis 4—4, Figure 2.

As shown in Figure 1 the lantern of the present invention is defined by an inner chimney 10 which terminates at its lower end in the flared reflector baffle 10a. This reflector baffle, which is free from contact with other parts at its outer rim, is positioned just above the incandescent mantle 12 to direct light downwardly therefrom and simultaneously serves the purpose of directing outer air downwardly into the globe as well as upwardly into the outer chimney. It also aids in directing the flow of products of combustion from the burner upwardly through the inner chimney. At its upper end the inner chimney 10 receives the bracket 14. This bracket in turn receives screw 16 which is threadedly received in the bracket 18a of the vent or hood 18.

The vent or hood 18 protects the lantern against falling objects and at the same time permits the escape of the products of combustion passing up the chimney 10 and of the cooling air around the inner chimney.

An outer chimney 20 encircles the inner chimney 10 and is in spaced relation therewith to define an annular chimney passage external to the chimney 10. Chimney 20 flares outwardly at its upper end as shown at 20a to mate with and bottom against the inwardly flared portion 18b of the vent or hood 18.

At its lower end the outer chimney 20 flares out at 20b. This flaring portion of the chimney defines an annular air inlet passage 22 in conjunction with the upper outer baffle 24 located immediately below chimney 20. As established by smoke tests, this additional air decreases the upward draft of air around the reflector baffle, thereby allowing a portion of the air introduced around the reflector baffle to move around the lower rim of the reflector baffle into the inner chimney, while in turn preventing the escape of products of combustion around the reflector baffle into the outer chimney and thence into the air tubes.

The upper outer baffle 24 is affixed by welding or some other suitable method to the lower outer baffle 26. As shown, the latter baffle has a horizontal portion 26a from which the vertical mounting brackets 26b extend, these brackets being affixed to the upper outer baffle 24. At its outer periphery the baffle 26 terminates in a depending collar 26c.

A plurality of spaced U-shaped support brackets 28 extend upwardly from the horizontal portion 26a of the baffle 26. These brackets receive the toroidal fuel tank 30 at their upper ends and are attached thereto by welding or by some other suitable means. Perforations are provided in these brackets to reduce heat conduction to the lower tank structure.

As indicated, the toroidal fuel tank 30 is of rectangular cross-section and is mounted in spaced relation to the outer chimney 20. The tank is formed by the mating upper and lower shells 30a and 30b, respectively. It can be clearly seen that the inner wall of the tank 30 forms an additional chimney or channel for the flow of outer cool air to reduce the transmission of heat emanating from the outer chimney.

A suitable support chain 32 is affixed to the tank 30.

The mantle 12 is received on the end of the fuel mixing tube 34 which is held by the manifold block 36. The block 36 is supported within chimney 10 by the air inlet tubes 38a and 38b which are received in the block 36 and extend in diametrically opposed directions to the wall of the inner chimney 10. Chimney 10 is provided with orifices opening into the ends of the air tubes 38a and 38b. Preferably the air tubes 38a and 38b are secured to the inner chimney 10 by welding or other suitable means.

The manifold block 36 has a threaded cap 40 with a longitudinal opening 40b and a depending skirt 40a. The opening 40b receives the end of the generator tube 42 and the nozzle tip 44 threadedly secured therein.

The upper end of the generator tube 42 is connected to the shut off valve 46 which is mounted on the upper surface of the tank 30. An intake tube 48 depends from the valve 46 to receive gasoline from the tank and convey it to the valve 46 and thence through generator 42 through fuel mixing tube 34 and to the burner. By this construction, the largest portion of that part of the generator which is located closest to the source of heat is disposed in vertical alignment with the mixing tube and is shielded by the manifold block against excessive heat, thereby prolonging the life of the generator.

A pump, shown generally at 50, is provided to impart air pressure to tank 30.

The upper outer baffle 24 and the outer chimney 20, are secured together by a plurality of brackets 52 which are affixed to these parts by welding or other suitable means and bottom against the inner chimney 10 and the outer chimney 20 to hold them in centered positions relative to each other.

The mantle 12 is protected by a depending globe 54 which is surrounded by a cage 57. The globe 54 has an upper outer peripheral flange 54a which is received by the annular support ring 56. As indicated, ring 56 has a horizontal flange portion 56b upon which globe 54 rests and an upstanding collar portion 56a which is received in the depending collar 26c of the ring 26.

The ring 56 is affixed at one point to part 58a of the hinge indicated generally at 58. The other part of this hinge is attached to the depending collar 26c of the ring 26, thus securing the ring 56 and the globe 54 to the lantern and permitting downward swinging movements thereof as shown in Figure 2.

The cage 57 is defined by a plurality of vertical posts or legs 57a secured to the horizontal portion 56b of ring 56 by welding or other suitable method. These are of like length to define spaced legs for the lantern to hold the same in an upright position when placed on a table. Horizontal rings 57b extend about the legs 57a to define a cage. Each ring is received in suitable openings in each leg and is secured therein by welding or other suitable means.

The glode 54 has an opening 54b to permit entrance of air.

In accordance with the present invention the globe 54 is held in the ring 56 by the lug 60. This lug is L-shaped and its vertical portion 60a is secured to the upstanding collar portion 56a of ring 56 at a point spaced from the hinge 58. As shown best in Figure 2, the inturned or horizontal portion 60b of the lub 60 overlies the flange 54a of globe 54. Thus, when the globe and cage are swung to the open position, shown in Figure 2, the globe is securely retained in ring 56 and it is not possible accidentally to drop the globe and cause its breakage or loss.

Further in accordance with the present invention, the lug 60 is provided with a threaded hole 60c. A bolt 62 has an enlarged collar 62a received on sleeve 64 and is adapted to be threadedly re-

ceived by the hole 60c to secure the ring 56 in the closed or horizontal condition as shown in Figure 1. The sleeve 64 is fastened into a suitable opening in the lower outer baffle 26. The distance between the top of sleeve 64 and the bottom of tank 30 is less than the length of the bolt 62, thereby preventing the removal of the bolt and avoiding misplacing or losing the same.

In operation of the lantern of the present invention, fuel travels from tank 30 through fuel tube 48 under the pressure of air introduced by pump 50. The fuel thereafter travels through the valve assembly 46 to the generator tube 42 from which it is sprayed into the mixing tube 34 by the orifice or nozzle tip 44 and to the mantle 12. The fuel thus discharged is ignited at the mantle and the resulting flame heats the generator, thereby vaporizing the fuel passing through the generator. As the fuel vapor discharged by the nozzle passes air tubes 38, it induces the flow of fresh air into the mixing tube 34 through the transverse air tubes 38*a* and 38*b* as indicated by the arrows 66. This air mixes with the fuel and burns at the mantle 12, thereby heating the mantle to incandescence.

Fresh air to the air tubes 38*a* and 38*b* travels through the annular space defined by the flared portion 20*b* of the outer chimney 20 as indicated by the arrows 68. This air is uncontaminated by the products of combustion and insures complete combustion. Additional air also enters the outer chimney 20 below the upper outer baffle 24. As indicated by the arrows 69 some of this air moves upwardly in chimney 20 while the remainder moves downwardly and around the outer rim of reflector baffle 10*a*. Some of the upwardly moving air in outer chimney 20 travels beyond the air tubes 38*a* and 38*b* as indicated by arrows 70. This air flow is induced by the heated chimney 10 and removes from the space between chimneys 10 and 20 the heat and stagnant air that would otherwise exist in this space. The temperature of outer chimney 20 is thereby reduced and the heat flow by convection and radiation from chimney 20 to the tank 30 is substantially decreased.

In addition, air flows up the annular space between tank 30 and the outer chimney 20 as indicated by the arrows 72. This air flow further acts to cool the outer chimney 20 and, in addition, cools the tank 30.

The air flow within the outer chimney 20 and between the outer chimney 20 and inner wall of the tank 30 exerts considerable cooling action and reduces the heat transmission to the tank 30 to a safe value. This is very important because the tank 30 is located in close proximity to highly heated components of the lantern which would otherwise raise the tank temperature to a dangerous value.

In accordance with the present invention, the spacing between toroidal fuel tank 30 and the outer chimney 20 is made sufficient to cool the tank effectively. We find that this demands that the spacing between the tank and the outer chimney be at least equal to the spacing between inner and outer chimneys.

It will be observed that the air tubes 38*a* and 38*b* are positioned in the inner chimney 10 at points where that chimney is encased by the outer chimney 20. The outer chimney thus forms an effective shield for the intake air tubes 38*a* and 38*b* and prevents undesirable air currents and drafts which would result in an unsteady light when the lantern is exposed to wind.

While we have shown and described a particular embodiment of our invention it will, of course, be understood that we do not wish to be limited thereto since we intend by the appended claims to cover all modifications and alternative constructions that fall within the true spirit and scope of our invention.

What we claim as new and desire to secure by letters patent of the United States is:

1. In an inverted incandescent mantle lantern for burning hydrocarbon fuel under pressure and of the type having an upper structure through which fuel is supplied to a mantle, the improvement comprising a globe having a flange, a ring adapted to receive said flange to hold said globe, hinge means adapted to hold said ring to said structure to permit downward swinging movements of said ring and said globe relative thereto, a cage affixed to said ring and extending down below said globe to define a support for said lamp, a lug on said ring extending inwardly at a point spaced from said hinge means and overlying said globe to retain said globe when the ring swings open, said lug having a threaded opening, and a bolt retained in said structure and adapted to be threadedly received in said lug releasably to hold said ring and said globe in the closed position.

2. An inverted mantle lantern for burning hydrocarbon fuel under pressure comprising a first cylindrical member defining therewithin a first chimney space, fuel-mixing means supported in said first chimney space, mantle-supporting means mounted on the lower end of said fuel-mixing means, an air tube extending radially in said first chimney space from said mixing means to and through the wall of said first cylindrical member, a second cylindrical member mounted around said first cylindrical member and defining a second chimney space between said first and second cylindrical members, the end of said air tube opening into and communicating with said second chimney space, a ring-shaped fuel tank having a much larger axial dimension than radial dimension closely overlying said second cylindrical member and spaced apart therefrom, and support means for the fuel tank disposed therebeneath and providing spaced air inlet apertures, said support means, said second cylindrical member, and said fuel tank defining a third chimney space facilitating flow of air in an upward stream between said tank and said second cylindrical chimney operative to shield said tank from hot products of combustion and to maintain it at a low temperature relative thereto.

3. Apparatus according to claim 2 wherein said second cylindrical means is provided near its lower end with spaced vents providing communication between said second chimney space and said third chimney space, and baffles associated with said vents extending into said third chimney space, said vents and baffles providing for interflow of air between said third chimney space and said second chimney space, whereby said second chimney space is provided with a source of cool air and said third chimney space is provided with a reduced-pressure zone aiding upward flow of air therein.

4. Apparatus according to claim 2 wherein a conduit is provided, extending from the top of said fuel tank to the central zone of said first chimney space and there turning downward and extending axially through said space to join and communicate with said mixing means, the axially extending portion of said conduit comprising a generator for utilizing heat from the products of

combustion to vaporize hydrocarbon fuel carried by said conduit to said mixing means.

LAURA A. DAVIS,
Executrix of the Last Will of Cortland Woodbury Davis, Deceased.

JOHN W. SWITACK.

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