Sept. 3, 1940. C. W. DAVIS ET AL 2,213,386

DEVICE FOR BURNING LIQUID FUEL

Filed Nov. 10, 1938 4 Sheets-Sheet 1

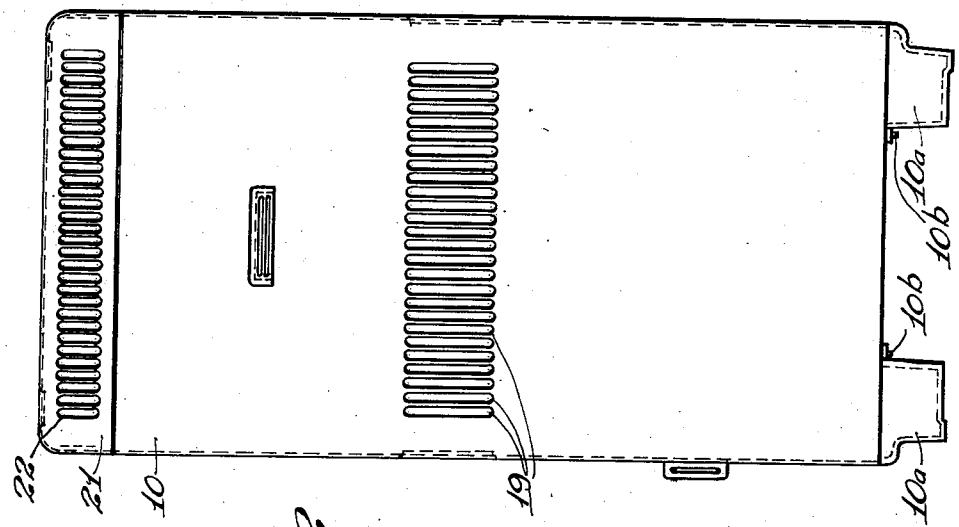

Fig. 2

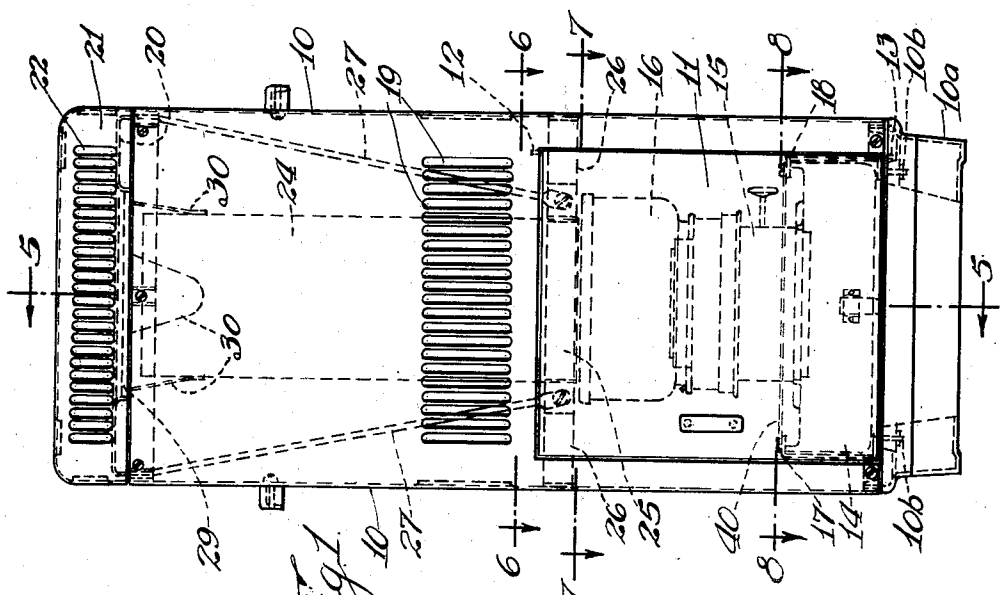

Fig. 1

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DEVICE FOR BURNING LIQUID FUEL

Filed Nov. 10, 1938 4 Sheets-Sheet 2

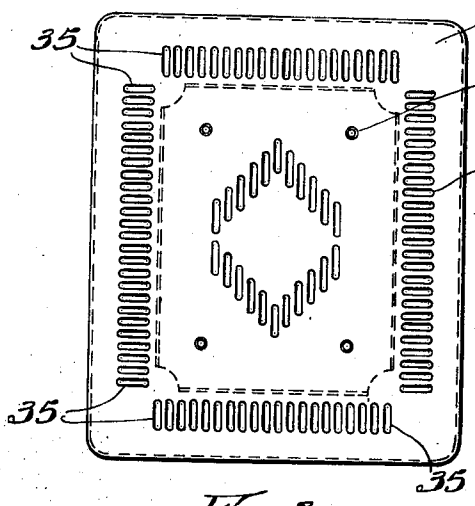

Fig. 3

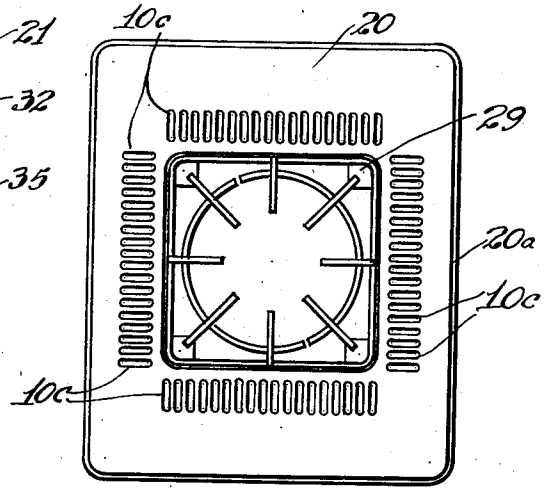

Fig. 4

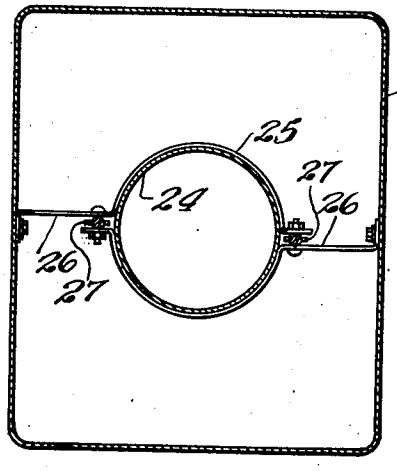

Fig. 6

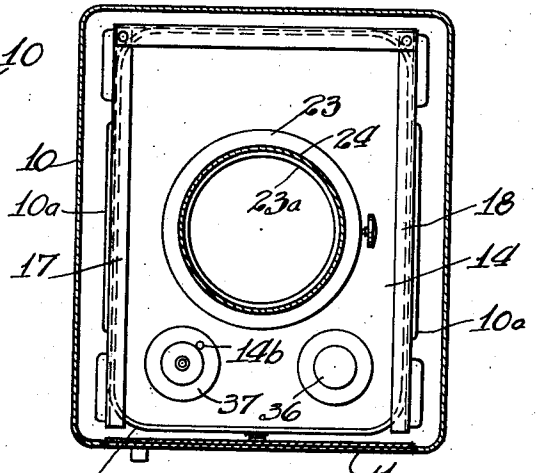

Fig. 7

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DEVICE FOR BURNING LIQUID FUEL

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Fig. 5.

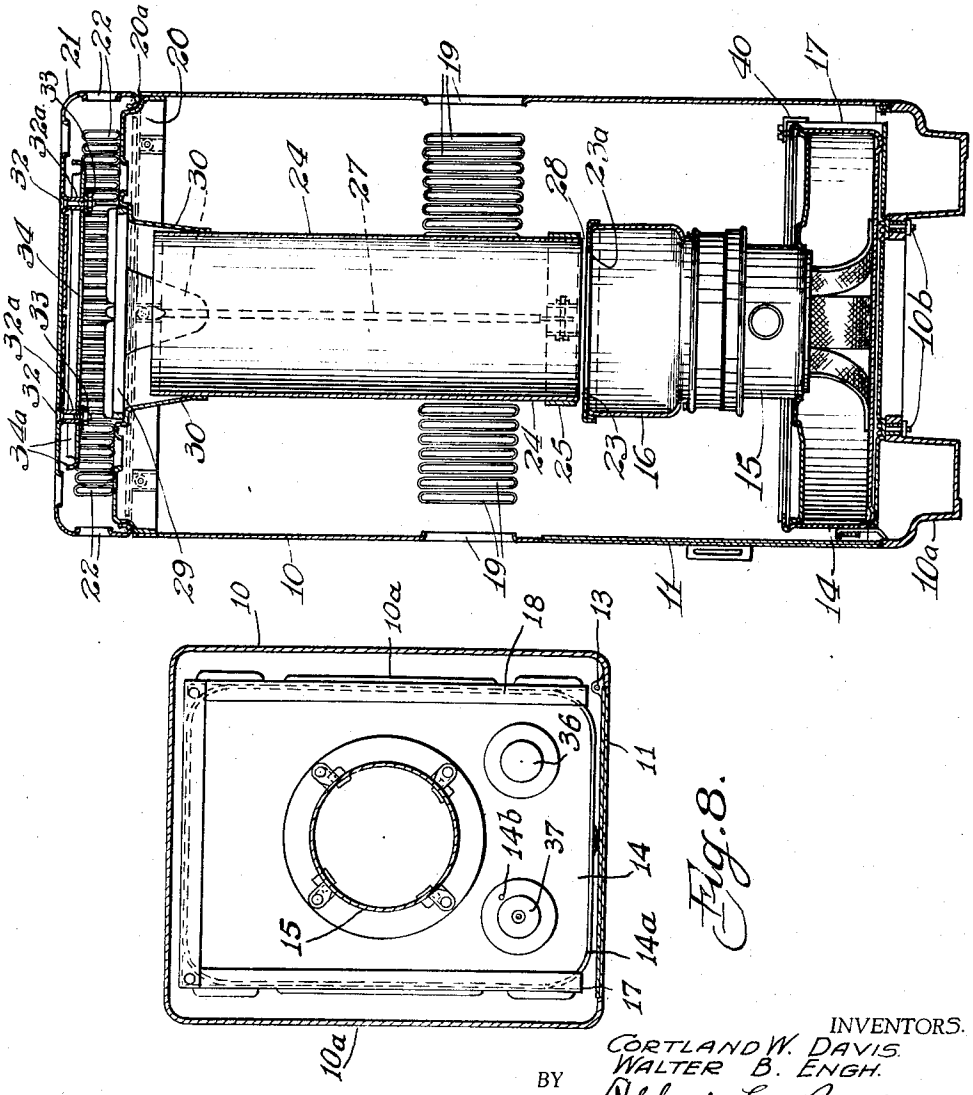

Fig. 8.

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DEVICE FOR BURNING LIQUID FUEL

Filed Nov. 10, 1938 4 Sheets-Sheet 4

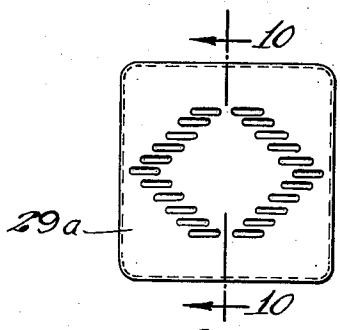

Fig. 9

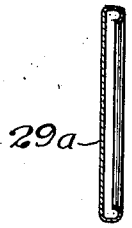

Fig. 10

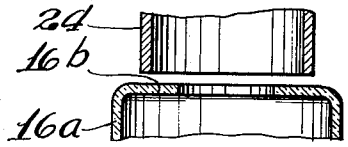

Fig. 11

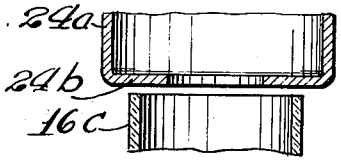

Fig. 12

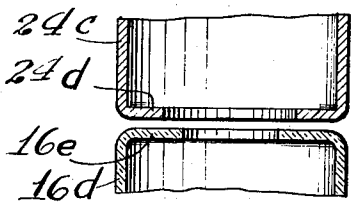

Fig. 13

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Patented Sept. 3, 1940 2,213,386

UNITED STATES PATENT OFFICE

2,213,386

DEVICE FOR BURNING LIQUID FUEL

Cortland W. Davis and Walter B. Engh, Alexandria, Ind., assignors to The Mantle Lamp Company of America, Chicago, Ill., a corporation of Illinois

Application November 10, 1938, Serial No. 239,856

14 Claims. (Cl. 126—47)

The invention consists of an improved liquid fuel burning device for cooking and for heating purposes of all kinds, which is preferably equipped with a wick-fed burner as the source of heat. The invention includes a burner and fuel reservoir mounted so that they may be moved horizontally to and from operative position, the burner and preferably a lower chimney section being mounted on the reservoir and movable therewith. An upper chimney section for cooperation with the lower chimney section when the burner is in operative position, is independently supported, so that the requisite draft may be established by the chimney structure as a whole, to cause efficient operation of the burner. The upper chimney section is preferably rigidly and adjustably supported at its lower end portion so as to have a definite location, its upper end portion being supported by guiding members against lateral displacement only, so that said upper section may expand and contract when it is heated and cooled, without change in the position of its lower end.

Suitable devices are employed for affording initial adjustment vertically of the upper chimney section, so that a desired vertical clearance may be effected between its lower end and the upper end of the lower chimney section. In this way, a fixed vertical clearance space is provided between the two chimney sections, which permits the lower chimney section to be moved horizontally with the burner from its operative to an inoperative position and to be returned to its operative position, without interference with the upper chimney section, and thus a horizontally disposed and fixed air passageway into the chimney is maintained, which is of uniform effect and is of sufficiently small extent so that the resulting draft of the chimney will cause the burner of the stove to operate efficiently, even with the check-draft effect of the air flowing into the chimney through said passageway, and with the marked advantages below described as resulting from said inflowing air.

A further feature of the invention consists in determining and defining said check-draft passageway by adjacent but spaced surfaces in planes substantially parallel with the direction of movement of said reservoir, for example, on the adjacent ends of the chimney sections, which surfaces are of such sizes and extents as to maintain a uniform effect of said passageway for limited lateral movement of said reservoir when in its operative position, at least one of said surfaces being preferably carried by and being a part of the chimney, for example, the lower section thereof, and preferably in the form of a flat ring on and constituting a part of said lower chimney section and having an external diameter substantially larger than the lower end of the upper chimney section, and an internal diameter substantially less than the diameter of the lower end of the upper chimney section. By this construction, the same effective amount of clearance space is maintained between the chimney sections, whether the reservoir is at all times in a position to exactly center the chimney sections relatively to each other, or not, thereby maintaining a constant check draft effect on the chimney action, for any inaccuracies in the location of the reservoir. This is of considerable advantage practically, since thereby the guiding ways or supports for the reservoir may have clearances which are found to be necessary from the standpoint of practical and inexpensive manufacture, and the use of accurately adjusted stops for centering the chimney sections is not necessary. In practice, it is preferred to make the lower chimney section of transparent glass so that the action of the burner may be observed through it, and the said lower chimney section preferably includes on its upper end and as a part of it, a flanged and removable metal ring having a flat upper surface as and for the purposes referred to, the flange on said ring serving to hold the ring in place on the chimney section.

With the construction described, the total chimney height is made substantially greater than usually employed with one-piece chimneys for the same kind of burners, to compensate for the draft diminution due to the check draft between the two chimney sections. The net effective draft with the improved two-section chimney construction, is substantially constant and is the optimum draft for the burner employed, and will result in the efficient functioning of the burner and in substantially perfect combustion of the liquid fuel. This is important with a burner of the blue flame type which is preferably used with the invention, to avoid the inefficiency and improper flame production resulting from too much draft and from too little draft.

The air introduced through the check draft increases the volume of the discharged hot gases and decreases their heat intensity or temperature, thus effecting better heat distribution and providing for more efficiently utilizing the heat produced, than is possible where the gases discharged from the chimney are very hot. The check draft passageway into the chimney, also prevents the conduction of heat from the upper section of the

chimney to the burner, the latter being consequently cooler and more stable in operation than it otherwise would be. Another important result of the action of the check draft passageway is that the air introduced thereby into the upper chimney section combines with and burns any stray or vagrant gases that are combustible, which may find their way into the upper chimney section. Actual tests show that with a blue flame burner, the temperature in the upper portion of the upper chimney section with the check draft in operation, is about 1000° F., that there is a substantial amount of uncombined oxygen in the gases about to be delivered from the chimney, and that there is not in the latter gases any appreciable amount of noxious or unpleasant fumes, such for example, as carbon monoxide or fuel odors. Other tests by which smoke having a characteristic odor was mixed with the air supplied to the chimney through the check draft passageway, showed that the smoke was burned and consumed in the upper chimney section, since no smoke was delivered from the chimney and the smoke odor could not be detected in the gases delivered from the chimney.

It has been found that the results described are best secured by locating the check draft passageway at least as high as the top part of the flame produced by the burner, and that a lower location of said passageway is apt to interfere with the proper production of an efficient flame, and that the passageway need not be continuous angularly as far as the described action in the upper chimney section is concerned, but that angularly spaced openings through the chimney wall will produce a similar result. The invention therefore includes a chimney structure having an opening or openings therethrough above the visible portion of the flame to produce an oxidizing atmosphere of high temperature in the chimney.

The fuel reservoir of the device is preferably provided with a sump construction on its upper surface, by extending an edge flange from the reservoir vertically above the top wall thereof and continuing said flange without interruption entirely around the upper, outer edge of the reservoir, so that in the event any of the liquid fuel is spilled on the reservoir, it will be held on the top thereof and find its way back into the reservoir through a small aperture or apertures in the top wall thereof provided for the purpose. This avoids the undesirable use of an extra catch basin or pan below the reservoir, which use has been common heretofore.

Another object of the invention is to provide a device adapted for both heating and cooking purposes, of such construction that it is efficient when used for cooking purposes, and enclosed at its upper end for heating purposes in a manner to conceal the cooking top of the device, so that when it is used for heating purposes it will have a pleasing and ornamental appearance with no indication that the cooking facilities are a part of the construction. To secure this result the device is provided with a casing preferably of sheet metal, to contain and support the parts described and to effectively direct the hot gases for heating and cooking purposes, said casing having at its upper end said cooking top, and having side openings which are both ornamental and useful. A removable cover having openings therein which are in keeping with the openings in the casing of the device, is also provided, to carry out the same plan of ornamentation employed in connection with the casing, the cover being so constructed and related to the casing when in place thereon, that it has the appearance of being a continuation of and a part of said casing. The cooking top of the device is preferably of sheet metal and provided with a grating of the kind usually employed for cooking purposes, supported in an inner edge groove around an opening in the cooking top over the upper end of the chimney, and part of the metal removed to form said opening, is cut and bent downwardly to form integral, resilient wings to engage the upper portion of the chimney to hold the same in position laterally and yet permit its expansion and contraction above referred to. The cooking top is preferably provided with symmetrically arranged openings through it, in any desired arrangement, so that it will not only operate effectively, but will also present a pleasing and artistic appearance when the removable cover is not used.

The removable cover of the device preferably contains a deflecting plate of novel construction and loosely supported to avoid distorting the removable cover, for effectively distributing the heat through side and top openings in the cover and more effectively utilizing the heat, than would be the case if the deflecting plate were not employed.

The above and other objects and advantages of the invention will be best understood by reference to the accompanying drawings illustrating a preferred embodiment thereof, in which

Fig. 1 illustrates the liquid fuel burning device with the removable cover thereon, in front elevation,

Fig. 2 shows in side elevation, the device illustrated in Fig. 1,

Fig. 3 is a top view of the device with the removable cover in place,

Fig. 4 is a top view of the device with the cover removed,

Fig. 5 is a vertical, sectional view through the device, taken along the line 5—5 in Fig. 1,

Figs. 6, 7 and 8 are horizontal, sectional views through the device, taken respectively along the lines 6—6, 7—7 and 8—8 in Fig. 1,

Fig. 9 shows in plan view a cover plate for use with the cooking top illustrated in Fig. 4, when it is desired to use the device principally for cooking purposes,

Fig. 10 is a vertical, sectional view through the cover plate shown in Fig. 9, taken along the line 10—10 in Fig. 9, and

Figs. 11, 12 and 13 show in vertical, central, sectional views, modified forms of the adjacent ends of the chimney sections.

Similar numerals refer to similar parts throughout the several views.

As shown in Fig. 1, the liquid fuel burning device consists of a casing 10 of sheet metal, provided in its lower front wall with a door 11 which may be swung on vertical pivots 12 and 13 to open position when it is desired to remove the reservoir 14, the burner 15 and the lower chimney section 16 from said casing, said burner 15 and lower chimney section 16 being carried by the reservoir. The reservoir 14 is supported for horizontal sliding movement into and from the casing, by parallel channel members 17 and 18 secured in horizontal position to the casing base 10*a*, by suitable screws 10*b*.

The casing 10 is provided with a plurality of narrow and vertically disposed apertures 19, extending entirely around the casing which as

shown is rectangular, which openings 19 permit air to flow freely into and from the casing, and they also permit the chimney section 16 to be observed from the exterior of the casing from any position around the device, and since the chimney section 16 is preferably made of transparent glass, the operation of the burner and the flame produced thereby may be similarly observed.

The upper end of the casing 10 carries a sheet metal cooking top 20 which for heating purposes is preferably enclosed by a removable cover 21 of sheet metal having in its side walls apertures 22 permitting the free flow of heated air through the sides of the cover, which cover is of the same dimensions horizontally as the casing 10, and so fitted at its lower end to the casing 10 that when it is in place on the casing, it has the appearance of being a part of the side walls of the casing and completely encloses and conceals the cooking top 20.

As shown in Fig. 5, the chimney section 16 includes on its upper end and as a part of it, a metal ring 23 having a flange extending downwardly from its outer edge which encircles the upper end of the chimney section 16 to hold said ring in place, said ring being provided with a flat and horizontal upper surface of substantial extent radially, so that the inner edge 23a of said ring, has a diameter substantially smaller than the inner diameter of the lower end of the upper chimney section 24, the outer diameter of the flange of the ring being substantially larger than the outer diameter of the lower end of said chimney section 24. The chimney section 24 is preferably made of sheet metal and is rigidly supported at its lower end by a clamping ring 25 supported as shown in Fig. 6, by radial arms 26 secured to the casing 10 by welding or otherwise, bracing rods 27 as indicated in Fig. 1, being preferably provided and extending from the ring 25 upwardly to the side walls of the casing to rigidly support the ring 25 against vertical movement. The ring 25 is preferably sectional as indicated in Fig. 6, and held together by suitable screws, so that by loosening said screws the chimney section 24 may be given any desired vertical adjustment in the ring 25 and then rigidly held in said adjustment by tightening said screws. In this way, the upper chimney section 24 may be adjusted to provide any desired vertical clearance 28 between the ring 23 of the lower chimney section 16, and the lower end of the upper chimney section 24, so that a definite amount of air will flow into the chimney through said horizontal clearance space between said chimney sections, and provide a check draft effect which is uniform in amount, regardless of the accuracy of location in the casing 10, of the reservoir 14 when in its operative position.

The sheet metal cooking top 20 is secured to the top of the casing 10 and is provided with a central rectangular aperture to receive a readily removable grating 29 seated in an edge groove formed around said aperture, (see Fig. 4), a part of the sheet metal cut from the cooking top 20 in forming said aperture being bent downwardly to form four resilient wings 30 for lightly engaging and centralizing the upper end portion of the chimney section 24, to hold the same against lateral displacement and yet at the same time to permit the upper portion of said chimney section to move relatively to said wings for expansion and contraction of said chimney section when it is heated and cooled. The grating 29 may be covered by a metal plate or lid 29a (Figs. 9 and 10) between cooking operations, or the grating may be replaced by said plate or lid when it is not desired to use the cover 21.

Around the edge of the cooking top 20, a groove 20a is formed to receive and fit the lower inturned edge of the cover 21, which cover is of the same form and dimensions laterally as the casing 10, so that when the lower edge of said cover is firmly seated in the groove 20a, the side surfaces of the cover are in effect continuations of the side surfaces of the casing 10, and the cover encloses and conceals the cooking top 20 and gives the appearance that the stove is intended only for heating purposes.

The cover 21 is provided with downwardly extending posts 32, having nuts 33 threaded on their lower ends to support a baffle plate 34, said plate having apertures therethrough for said posts, which apertures are enough larger than said posts to permit expansion and contraction of said plate for changes in its temperature, without exerting forces on said posts that might warp the cover 21. The nuts 33 are rigidly secured to the posts 32 after mounting the plate 34 thereon, in any convenient manner, for example, by riveting the ends of said posts. The plate 34 is preferably provided with an edge flange 34a to hold it against distortion. The spacing of the plate 34 from the cover 21 may be effected in any convenient manner, for example, by sleeves 32a on the posts 32 between said plate and said cover. The baffle plate is located over the upper end of the chimney section 24 and is spaced sufficiently above the cooking top 20 and below the top of the cover 21 to permit the heated air and gases projected against said baffle plate from the chimney section 24, to flow freely laterally to the sides of the cover 21 and through the apertures 22 in its side walls, a part of said heated air and gases also flowing around said baffle plate and through the top apertures 35 in the cover, which top apertures may be arranged in any desired patterns for ornamental purposes, as shown in Fig. 3. The cooking top 20 as shown in Fig. 4, is preferably perforate at 10c in any desired pattern or arrangement, around the grating 29, so that the heated air around the exterior of the chimney may flow freely upward and out the top of the casing. The cooking top 20 is thus given a pleasing appearance, and the device may be effectively used both for cooking and heating purposes without the use of the removable cover 21, particularly where cooking operations occur frequently.

As shown in Fig. 5, the reservoir 14 is provided with a top edge flange 14a which, as shown in Fig. 8, extends entirely around the reservoir, to form a sump on the top of the reservoir to retain any liquid fuel that may be spilled on the reservoir in filling the same, or for any other reason, the top of the reservoir being preferably provided with a small aperture 14b which drains any liquid fuel accumulating on the reservoir, into said reservoir. The flange 14a by its relation to the guideways 17 and 18 holds the reservoir substantially horizontal when it is partially withdrawn from the casing to light or extinguish the burner flame. The reservoir 14 is provided with a filling cap 36 and a fuel level indicator 37, which may be of any well-known construction.

In Fig. 7 the relation between the diameter of the lower end of the upper chimney section 24

and the inner and outer diameters of the ring 23 of the lower chimney section 16 is illustrated, to show how the lower end surface of the upper chimney section 24 is maintained over the upper horizontal end surface of the lower chimney section 16 for substantial differences in position of the lower chimney section 16 laterally relatively to the lower end of the chimney section 24, for example, because of substantial clearances between the reservoir 14 and the channel-shaped supporting guideways 17 and 18, as well as because of the possibility of not moving the reservoir 14 as far into the casing 10 as required to center the chimney section 16 with the chimney section 24. In this way, the necessity for having accurate aligning devices for imparting a specific and definite location to the reservoir 14 and to the chimney section 16 may be avoided, and as long as the reservoir 14 is moved into the guideways 17 and 18 against the stop bar 40 carried by the rear ends of said guideways, the device will operate quite as well as though the chimney section 16 were accurately centered relatively to the chimney section 24.

In Figs. 11, 12 and 13 the adjacent end portions of modified forms of chimney sections are illustrated. In Fig. 11, the lower chimney section 16*a* is provided with an integral and horizontally extending end flange 16*b* having inner and outer diameters respectively smaller and larger than the corresponding diameters of the lower end of the upper chimney section 24. With this construction the flow upwardly in the chimney from the burner, is controlled by the inner diameter of said flange and is constant for different relative positions of the chimney sections laterally as long as the chimney section 24 is in line with some part of said flange, and the check draft effect is determined by the amount of separation of the chimney section 24 from said flange and is constant for the range of relative lateral displacements for which the chimney section 24 is in line with some part of said flange, substantially as above described for the ring 23. In Fig. 12, the lower chimney section 16*c* is of smaller diameter than the lower end portion of the upper chimney section 24*a* and the latter is provided with a horizontal end flange 24*b* which has inner and outer diameters respectively smaller and larger than the corresponding diameters of the adjacent end of the chimney section 16*c*, the operation of the structure being substantially the same as that of the structure illustrated in Fig. 11.

In Fig. 13, the adjacent ends of the chimney sections 16*d* and 24*c* are shown as having respectively horizontal end flanges 16*e* and 24*d* having substantially the same outer diameters, the inner diameter of the flange 24*d* being greater than the inner diameter of the flange 16*e*. In this case the check draft effect is constant for relative lateral displacement of the said flanges, and the effective chimney draft is also constant, as long as the flange 24*d* does not overlap the opening in the flange 16*e*.

It will thus appear that the adjacent ends of the chimney sections may have various end conformations to form the check draft passageway, that are effective in maintaining a substantially constant check draft and also a substantially constant effective chimney draft, for relative lateral displacement of the adjacent ends of the chimney sections, but that in any case, at least one of said ends should be provided wih a surface of substantial extent radially. Although the ring 23 and the flanges 16*b*, 24*b* and 16*e* are provided with openings of reduced diameter through which the gases of combustion must pass, the chimney draft is not substantially changed thereby, because of said ring and said flanges being of small thickness. It is preferable, however, that the one of said ends having the smaller opening should be located below the check draft passageway, since by so doing a zone of subatmospheric pressure is produced inside of the lower end of the upper chimney section and around the inner end of the check draft passageway, which increases the induced air flow through said passageway into the chimney. Although the chimney sections may be made of any suitable material, it is in practice found advisable to make the lower chimney section of transparent glass to permit easy inspection of the flame of the burner, and to the same end, the openings 19 through the casing 10 permit such inspection from the outside of the casing with the device in operation, since said openings are formed in horizontal rows through all sides of the casing, the openings being of sufficient extent vertically so that said inspection may be made either from a sitting or a standing position. The ring 23 forming part of the glass chimney section 16, besides forming the check draft passageway, as described, also serves as a guard for the upper end of the section 16, and protects it from being accidentally chipped or cracked.

Although with the construction described, the adjacent ends of the chimney sections are separated vertically for mechanical clearance purposes, and the efficiency of operation of the device is improved as described, by the check draft action, it does not appear that for a given burner construction, there is a critical height for the check draft passageway, but that said height may be changed within rather narrow limits without appreciable change in the efficiency of operation of the device. It will be understood that if said height is increased, the check draft is increased and the chimney height must be increased to give the same effective chimney draft as before, and that the reverse is also true. In considering the relation to the upper chimney section, of the lower chimney section and the burner and reservoir by which said lower chimney section is carried, any position of said lower chimney section, burner and reservoir is considered to be an operative position thereof, which places the entire lower end of the chimney section 24 substantially over the upper surface of the ring 23, or the equivalent for the modified constructions illustrated, and any other position of said lower chimney section, burner and reservoir is considered to be an inoperative position thereof.

It will be understood that the improved liquid fuel burning device above illustrated and described, is adapted for use with any desired kind of liquid fuel as a source of heat, which may be vaporized at atmospheric pressure without the use of generators, control valves, and pressure nozzles, and particularly where said liquid fuel is non-explosive and is susceptible of burning with a blue flame by the mixture with its vapor at substantially atmospheric pressure, of the amount of air requisite to produce complete combustion, well known examples of such liquid fuels being kerosene, alcohol, and fuel oils used in domestic heating plants, although our device described may be used with any liquid fuel adapted to the purpose. Our improved device may be effectively used for cooking purposes, for heating rooms, for heaters for water and other liquids and materials,

and for any other purpose for which the structure can be adapted to serve as a source of heat.

While we have shown our invention in the particular embodiment above described, we do not limit ourselves thereto as we may employ equivalents thereof without departing from the scope of the appended claims.

Having thus described our invention, what we claim is:

1. A device for burning liquid fuel including in combination a fuel reservoir, a burner carried by said reservoir, a lower chimney section carried by and having fixed operative relation to said burner, and an upper chimney section supported independently of said reservoir with its lower end surface above and spaced vertically from the upper end surface of said lower chimney section, one of said adjacent chimney end surfaces having inner and outer dimensions respectively substantially less and greater than the corresponding dimensions of the other of said end surfaces, whereby the vertical spacing and resultant check-draft effect between said adjacent chimney end surfaces is maintained substantially constant for different positions of said reservoir.

2. A device for burning liquid fuel including in combination a fuel reservoir, a burner carried by said reservoir, a lower chimney section carried by and having fixed operative relation to said burner, and an upper chimney section supported independently of said reservoir with its lower end surface above and spaced vertically from the upper end surface of said lower chimney section, one of said adjacent chimney end surfaces having inner and outer dimensions respectively substantially less and greater than the corresponding dimensions of the other of said end surfaces, whereby the vertical spacing and resultant check-draft effect between said adjacent chimney end surfaces is maintained substantially constant for different positions of said reservoir, said lower chimney section including a glass structure and a metal ring on the upper end of said glass structure and having a flat upper surface.

3. A device for burning liquid fuel including in combination a fuel reservoir, a burner carried by said reservoir, a lower chimney section carried by and having fixed operative relation to said burner, and an upper chimney section supported independently of said reservoir with its lower end surface above and spaced vertically from the upper end surface of said lower chimney section, one of said adjacent chimney end surfaces having inner and outer dimensions respectively substantially less and greater than the corresponding dimensions of the other of said end surfaces, whereby the vertical spacing and resultant check-draft effect between said adjacent chimney end surfaces is maintained substantially constant for different positions of said reservoir, said lower chimney section including a structure of glass and a metal ring resting on the upper end of said glass structure and having a flat upper surface, said ring having a depending flange engaging a side surface of said glass structure to retain said ring in place.

4. In a device for burning liquid fuel, the combination of a burner, and two substantially aligned chimney sections having substantially parallel and adjacent end surfaces spaced from each other, one of said end surfaces having substantial area and extending inwardly and outwardly beyond the other of said end surfaces, thereby maintaining the combined draft of the chimney sections substantially unchanged for lateral displacement of one of said end surfaces relatively to the other of said end surfaces.

5. A device for burning liquid fuel including in combination a fuel reservoir, a burner carried by said reservoir, a lower chimney section carried by and having fixed operative relation to said burner, an upper chimney section supported independently of said reservoir with its lower end surface above and spaced vertically from the upper end surface of said lower chimney section, one of said adjacent chimney end surfaces having inner and outer dimensions respectively substantially less and greater than the corresponding dimensions of the other of said end surfaces, whereby the vertical spacing and resultant check-draft effect between said adjacent chimney end surfaces is maintained substantially constant for different positions of said reservoir, and rigid holding means engaging the lower end portion of said upper chimney section.

6. A device for burning liquid fuel including in combination a fuel reservoir, a burner carried by said reservoir, a lower chimney section carried by and having fixed operative relation to said burner, an upper chimney section supported independently of said reservoir with its lower end surface above and spaced vertically from the upper end surface of said lower chimney section, one of said adjacent chimney end surfaces having inner and outer dimensions respectively substantially less and greater than the corresponding dimensions of the other of said end surfaces, whereby the vertical spacing and resultant check-draft effect between said adjacent chimney end surfaces is maintained substantially constant for different positions of said reservoir, and supporting means adjustably engaging the lower end portion of said upper chimney section for vertical adjustment of the latter.

7. A device for burning liquid fuel including in combination a fuel reservoir, a burner carried by said reservoir, a lower chimney section carried by and having fixed operative relation to said burner, an upper chimney section supported independently of said reservoir with its lower end surface above and spaced vertically from the upper end surface of said lower chimney section, one of said adjacent chimney end surfaces having inner and outer dimensions respectively substantially less and greater than the corresponding dimensions of the other of said end surfaces, whereby the vertical spacing and resultant check-draft effect between said adjacent chimney end surfaces is maintained substantially constant for different positions of said reservoir, rigid holding means engaging the lower end portion of said upper chimney section, and retaining devices slidably engaging the upper end portion of said upper chimney section and restraining said upper end portion against lateral displacement.

8. In a device for burning liquid fuel, the combination of a metal casing, a fuel reservoir mounted for horizontal movement into and from said casing, a burner carried by and having fixed relation to said reservoir, a lower chimney section carried by and having fixed relation to said burner, an upper chimney section supported by said casing with its lower end surface above and spaced vertically from the upper end surface of said lower chimney section, one of said adjacent chimney end surfaces having inner and outer dimensions respectively substantially less and greater than the corresponding dimensions of the other of said end surfaces, whereby the verti-

cal spacing and resultant check-draft effect between said adjacent chimney end surfaces is maintained substantially constant for different positions of said reservoir, rigid holding means around the lower end portion of said upper chimney section, and retaining devices slidably engaging the upper end portion of said upper chimney section and restraining said upper end portion against lateral displacement, said retaining devices comprising resilient wing members depending from the top wall of said casing.

9. A device for burning liquid fuel including in combination a fuel reservoir, a burner carried by said reservoir, a lower chimney section carried by and having fixed operative relation to said burner, an upper chimney section supported independently of said reservoir with its lower end surface above and spaced vertically from the upper end surface of said lower chimney section, one of said adjacent chimney end surfaces having inner and outer dimensions respectively substantially less and greater than the corresponding dimensions of the other of said end surfaces, whereby the vertical spacing and resultant check-draft effect between said adjacent chimney end surfaces is maintained substantially constant for different positions of said reservoir, and horizontal guides supporting said reservoir for horizontal movement and maintaining said vertical spacing between the end surfaces of said chimney sections.

10. A device for burning liquid fuel including in combination a fuel reservoir, a burner carried by said reservoir, a lower chimney section carried by and having fixed operative relation to said burner, an upper chimney section supported independently of said reservoir with its lower end surface above and spaced vertically from the upper end surface of said lower chimney section, one of said adjacent chimney end surfaces having inner and outer dimensions respectively substantially less and greater than the corresponding dimensions of the other of said end surfaces, whereby the vertical spacing and resultant check-draft effect between said adjacent chimney end surfaces is maintained substantially constant for different positions of said reservoir, and horizontal channel shaped side guides having flanges extending over and under the side edge portions of said reservoir to guide horizontal movement of said reservoir and maintain said vertical spacing between the end surfaces of said chimney sections.

11. A device fo burning liquid fuel including in combination a fuel reservoir, a burner carried by said reservoir, a lower chimney section carried by and having fixed operative relation to said burner, an upper chimney section supported independently of said reservoir with its lower end surface above and spaced vertically from the upper end surface of said lower chimney section, one of said adjacent chimney end surfaces having inner and outer dimensions respectively substantially less and greater than the corresponding dimensions of the other of said end surfaces, whereby the vertical spacing and resultant check-draft effect between said adjacent chimney end surfaces is maintained substantially constant for different positions of said reservoir, and horizontal channel shaped side guides having flanges extending over and under the side edge portions of said reservoir to guide horizontal movement of said reservoir and maintain said vertical spacing between the end surfaces of said chimney sections, said reservoir having a continuous flange extending upwardly from its upper outer edge portion and forming a sump on top of said reservoir, the upper edges of the side portions of said continuous flange being below and adjacent the upper flanges of said channel guides.

12. A device for burning liquid fuel including in combination a burner, a lower chimney section having fixed cooperative relation with said burner, and an upper chimney section having fixed support above and cooperating with said lower chimney section, said chimney sections having adjacent ends above the visible portion of the flame of the burner, said adjacent ends being spaced vertically from each other and admitting restricted air flow into said upper chimney section.

13. A device for burning liquid fuel including in combination a burner, a lower chimney section cooperating with said burner, and an upper chimney section supported above and cooperating with said lower chimney section, said chimney sections having adjacent ends above the visible portion of the flame of the burner, said adjacent ends being spaced from each other and admitting restricted air flow into said upper chimney section, said lower chimney section including a flat ring on its upper end, said ring having internal and external diameters respectively substantially less and greater than the internal and external diameters of the lower end of said upper chimney section.

14. A device for burning liquid fuel including in combination a burner, a lower chimney section cooperating with said burner, and an upper chimney section supported above and cooperating with said lower chimney section, said chimney sections having adjacent ends above the visible portion of the flame of the burner, said adjacent ends being spaced from each other and admitting restricted air flow into said upper chimney section, said lower chimney section including at its upper end an internal conformation directing the gases of combustion towards the axis of the chimney, thereby producing sub-atmospheric pressure in said chimney at the lower end of said upper chimney section.

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