W. E. SHARP.

HEATER.

APPLICATION FILED FEB. 21, 1910.

1,054,462.

Patented Feb. 25, 1913.

3 SHEETS—SHEET 1.

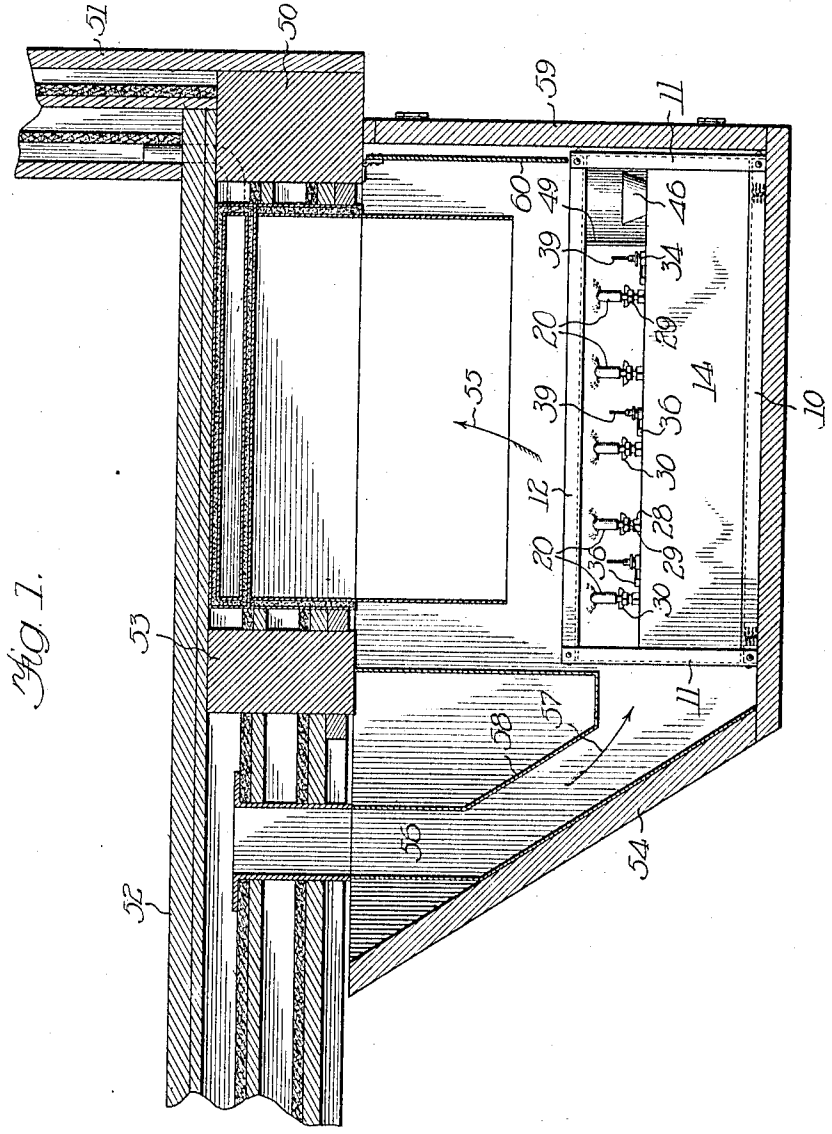

Fig 1.

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3 SHEETS—SHEET 2.

Fig. 2.

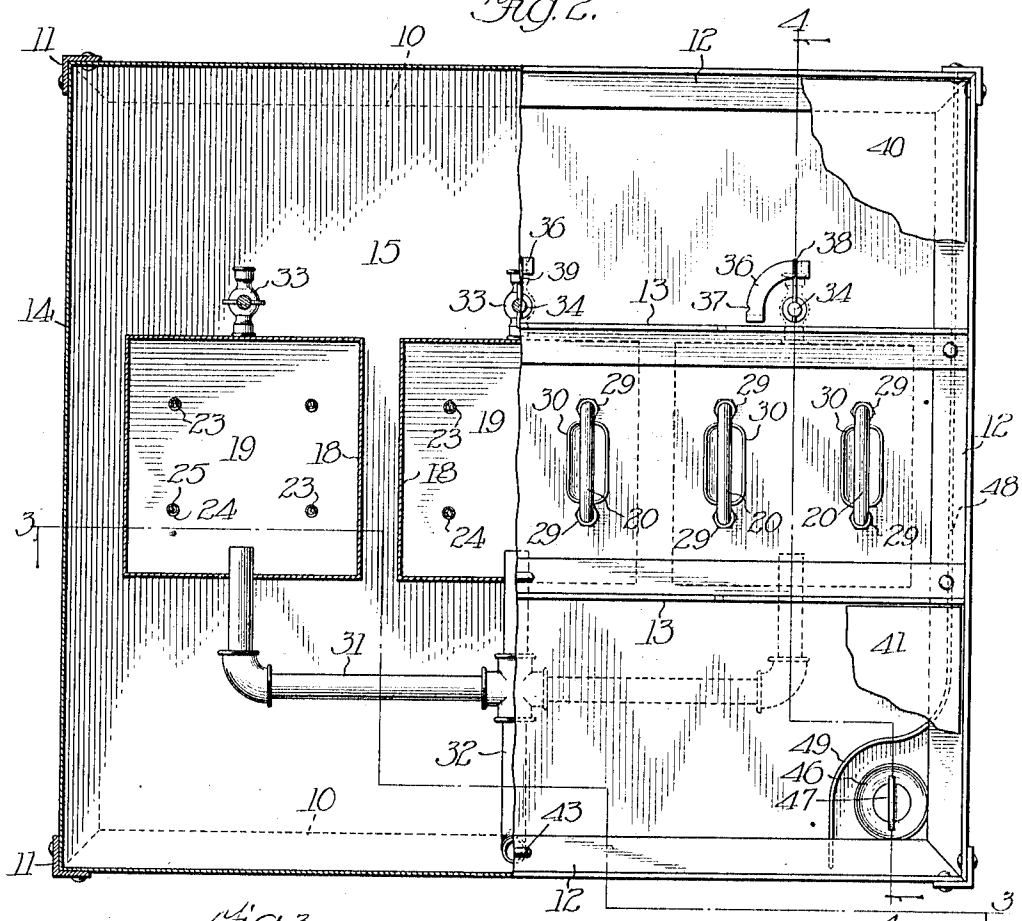
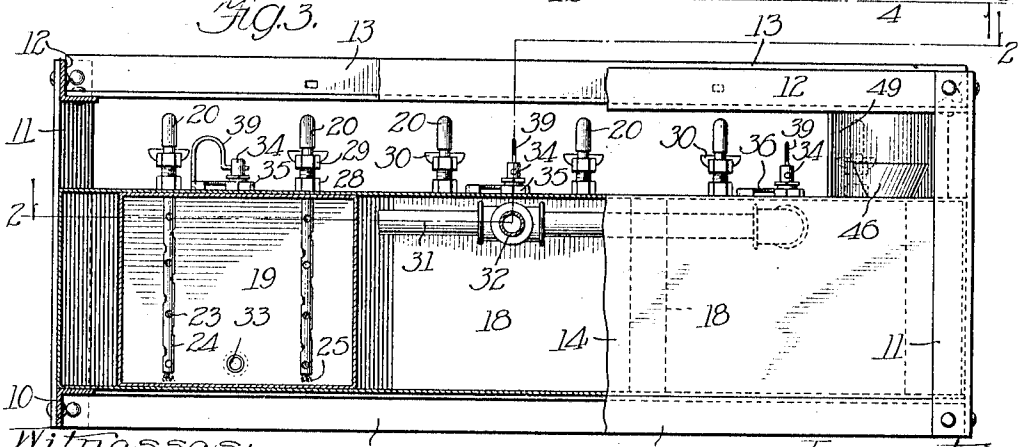


Fig. 3.



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3 SHEETS—SHEET 3.

Fig. 4.

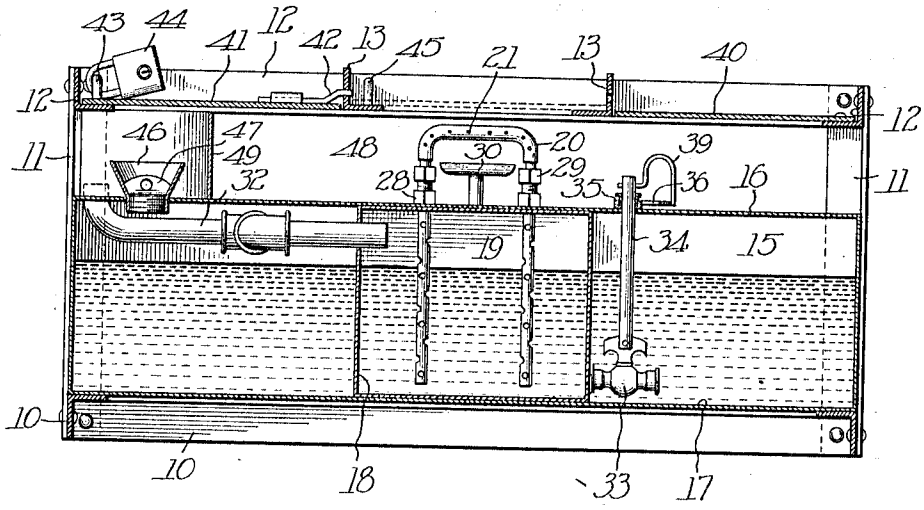


Fig. 5.

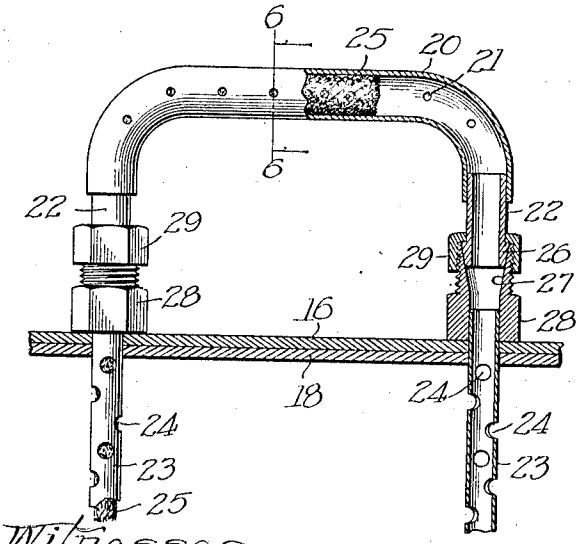


Fig. 6.

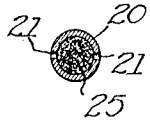
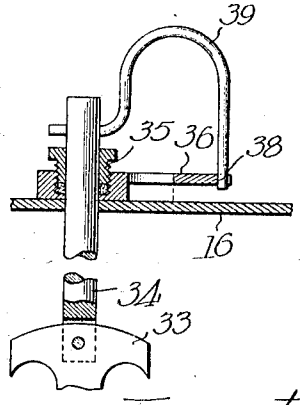


Fig. 7.



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UNITED STATES PATENT OFFICE.

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HEATER.

1,054,462. Specification of Letters Patent. Patented Feb. 25, 1913.

Application filed February 21, 1910. Serial No. 545,021.

To all whom it may concern:

Be it known that I, WILLIAM E. SHARP, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Heaters, of which the following is a specification.

The heating of railway cars for transporting fruits, vegetables and the like during the winter months, to prevent frosting, freezing or undue chilling of the lading presents a complex problem which in its solution requires the consideration of a number of points and the surmounting of a variety of difficulties. Many and various styles and types of heaters or stoves have been used for this purpose, all of which fail to meet all of the requirements incident to the proper preservation of the goods transported.

In the first place, it may be remarked that it is ordinarily only necessary to prevent the temperature of the interior of the car from descending to the freezing point or thereabout, sufficient heat being provided for this purpose to prevent the outer cold air from lowering the temperature of the interior to such a point. No great amount of heat is necessary, but what little is needed is of vast importance. Whatever form of stove or heater is employed, it must be capable of continuous operation or burning for a considerable number of hours, or even days, without attention, and without danger of its defective operation or cessation of burning. Furthermore, the satisfactory performance or burning of the stove must not be detrimentally influenced or the efficient operation of the heater destroyed by the vibration of the car or by the violent or sudden jolts or jars to which a car is not infrequently subjected. Moreover, the heater and the fuel which it uses must not materially abstract moisture from the interior of the car, otherwise the condition of the lading is more or less seriously damaged, some articles, such, for example, as celery, potatoes, apples, &c., deteriorating substantially under improper moisture conditions. Again, the products of combustion which enter the car from such a heater should not vitiate the air therein to any material extent, otherwise the quality of the lading is likely to be seriously modified, some fruits and vegetables being very sensitive in this respect. These and other problems are satisfactorily solved by the provision of heaters incorporating or embodying my invention set forth in detail below. I have discovered that alcohol, even commercial or wood alcohol, forms a particularly advantageous fuel to use for this purpose, for the reason that it requires but little oxygen other than that contained in itself for carrying on combustion, and consequently a heater or stove burning the same can be used in conjunction with a substantially air-tight car without the admission of the cold outside or external air other than the slight amount which may leak through the walls of a well-built, tight car. Obviously, under such conditions, less fuel is required to maintain the temperature in the car above the minimum limit than in heaters or cars requiring the introduction of a certain amount of cold air to supply the oxygen of combustion. Alcohol burned in this way does not to but a very limited extent vitiate or foul the air detrimentally, and it is possible without discomfort to enter and stay in such a car after such a stove has heated the same for many hours. Another advantage of a stove of this kind is that the burning of the alcohol does not dry out the air of the car, the products of combustion supplying sufficient moisture to keep the fruit and vegetables in prime condition.

The details of construction of a stove embodying my invention can be readily understood from the detailed description below of a preferred and desirable embodiment of the same, which explanation and description should be read in connection with the accompanying drawings forming a part of this specification, and throughout the various views of which like reference characters refer to the same parts. It may be remarked, however, that in a stove or heater of this kind, by the provision of a gas or vapor pocket or chamber above the body of alcohol, which is open to the atmosphere, the jarring or vibration of the car has little or no effect on the burning of the heater. In any case, no such jolting can extinguish the flame. Many other points or features of novelty and advantage will be made apparent from what follows.

In the accompanying drawings, Figure 1 is a vertical cross section through a portion of a car-body and through the compart-

ment containing my improved form and style of heater; Fig. 2 is a partial plan and partial horizontal section of such heater, the parts being viewed as indicated by the arrows and section line 2—2 of Fig. 3; Fig. 3 is a vertical section through the heater on line 3—3 of Fig. 2; Fig. 4 is a vertical section through the heater on line 4—4 of Fig. 2; Fig. 5 is a partial section and partial elevation of one of the burners; Fig. 6 is a cross section through the burner on line 6—6 of Fig. 5; and Fig. 7 shows in elevation, and partly in section, the means for actuating the valves connecting the reservoir compartment with one of the alcohol or liquid chambers of the heater.

By referring to the drawings, it will be readily understood that the heater proper is mounted in a frame built up of angle bars, such frame being composed of four bottom bars 10 connected at the four corners with a corresponding number of upright angle posts 11, the top ends of which are connected together by the upper marginal, horizontal angle bars 12. Two of such bars 12 on opposite sides of the frame are connected together by a pair of inner angle bars 13, 13, provided for a purpose hereinafter indicated. The lower angle bars 10, joined together to form a rectangular lower frame, have their top flanges disposed inwardly to form a support or seat for the stove or heater proper, which consists of a rectangular sheet-metal tank, the interior 15 of which forms an alcohol or liquid reservoir compartment, the height of such casing or chamber 14 being approximately one-half that of the framework described above, as is clearly illustrated in Fig. 4. In this rectangular casing 14, which, as shown, has flat, horizontal top and bottom walls 16 and 17, I position a plurality, in the present instance three, of liquid containers or casings 18, of much smaller size than the casing 14, the top and bottom walls of the two being in contact, as shown in Fig. 4. The interiors 19 of these smaller casings 18, I characterize as liquid chambers, since they are adapted to hold or receive the alcohol during its consumption by the burners. Each of the casings or compartments 18 is provided with a pair of burners, each of which consists of a thin, inverted, substantially U-shaped copper tube 20 having small perforations 21 therethrough on each side, as I have clearly illustrated in Figs. 5 and 6, the ends of such tube having fitted thereto connectors 22 adapted for disengageable connection in any approved manner with companion connectors 28 secured on the top of the tank in register with holes or openings through such top. A suitable wick 25, preferably, though not necessarily, of cotton, is provided in the bent burner tube 21.

The comparatively inexpensive perforated tin tubes 23 may be attached to the externally screw-threaded member 28 which is fastened to the top 16 of the tank. These tubes 23 extend downwardly, and within them may be contained the ends of the wick 25, which is thus held in contact with the fuel within the chamber. The connecting piece 22 between each end of the burner tube 20 and the screw-threaded member 28 is provided with a head 26, which is externally tapered and fits within the flaring mouth 27 of the member 28. The connecting piece 22 and the member 28 are held together by means of the nut 29. As I have indicated, each of the liquid compartments 19 has two of such burners, and beneath each I position a cup or saucer 30 for the reception of a small amount of alcohol, which may be burned therein for the preliminary heating of the wick and tube-burner. Each of these compartments 19 near its top is in connection with a vent pipe 31, which in turn is in communication with the outer air by an upwardly bent pipe 32 extending out through the top wall 16 of the reservoir 10, as is clearly shown in Figs. 2 and 4.

In order to control and govern the flow of the alcohol or other liquid from the reservoir 15 to the individual liquid chambers 19, I provide the side of each of the latter with a shut-off valve 33, the handle of each of which has fixed thereto a rod 34 extending upwardly through the top wall 16 of the tank and through a stuffing box 35 mounted thereon. A notched locking plate 36, having a pair of notches 37 and 38, is mounted on the tank concentric to the rod 34, the latter having a bent spring arm 39 constituting a handle for the rod 34, and adapted to be held in either of the notches 37 or 38 to maintain the valve in open or closed position, as is desired. In order to protect these actuating members of the valves from injury, I mount in the top of the frame, between one of the angle bars 12 and the next adjacent bar 13, a metal plate 40, and in the frame, above the pipe 32, I detachably mount another similar protecting plate 41 having a pair of prongs 42 adapted to be fitted into apertures in the upstanding flange of the adjacent angle bar 13, the plate being securely held in proper position in the frame by means of a wire loop or staple 43 extended through a hole in the plate, and having a padlock 44 applied thereto. This plate 41, during transportation of the heater other than when it is mounted on a car for heating purposes, is adapted to be applied to the central opening in the top portion of the frame between the two angle bars 13, a staple 45 being provided on one of the latter for the application of the padlock; the other bar being

apertured for the reception of the prongs 42. When the plate 41 is in this central position, obviously it protects the burners from damage or injury during transit.

The reservoir or compartment 15 is adapted to be filled or charged through a mouth 46, ordinarily closed by a screw plug 47, and in order that alcohol may be introduced through this opening while the stove is burning, and without danger of having the flames thereof blown out or extinguished, I supply the top of the tank with a protecting upstanding flange 48, which is offset or curved at 49 to avoid the parts 46 and 47.

In Fig. 1, the manner of applying or using such stove or heater in connection with a railway car is indicated, and in this figure 50 represents the side sill of the car, 51 the insulated side wall, 52 the bottom of the car, 53 an intermediate sill, and 54 a housing mounted on the bottom of the car and adapted to contain the heater. Heated air from such stove and the products of combustion pass upwardly from the same, as is indicated by the arrow 55, the heated gases entering the substantially air-tight car-body in any approved manner, the cooled air of such car returning to the stove through the duct 56, as is shown by the arrow 57, the compartment 54 having therein a hollow partition 58 which compels the cooled air to come in contact with the stove below the flames thereof.

At its outer side, the compartment 54 is supplied with a door 59, which may be opened for the introduction or removal of the stove, for its inspection, or for the filling of its reservoir tank, and in order not to disturb the heating conditions and the burning of the stove during such opening of the door, a shield 60 is employed, depending from the sill 50, as is clearly illustrated.

I wish to have it understood that a heater of this kind is adapted to be used in connection with substantial and well-built cars, the walls of which are insulated, and which are practically air-tight, so that substantially no outer air enters the car during the heating operation except such slight amount as necessarily leaks through the walls of any car of this type.

The operation of this appliance is substantially as follows: Assuming that the reservoir compartment 15 has been substantially filled with the liquid to be consumed, preferably alcohol, commercial wood alcohol being quite satisfactory, the valves 33 are, either before or after the filling operation, opened by the turning of their handles 39 so as to permit the flow of the alcohol into the heater or liquid chambers 19, and the handles 39 are then adjusted so as to permit further liquid to pass into these chambers, or to prevent the entrance of more liquid, as the requirements dictate; that is, if the car is to pass for an extended period of time through a particularly cold region, all of the valves 33 would be left open, but if the car was to start from a portion of the country having a cold climate and to travel in a southerly direction, so that the external temperature would gradually rise, one or more valves 33 would be closed after their particular chambers 19 had received the first charge of alcohol, whereby after such alcohol had been consumed, the flames of these particular burners would become automatically extinguished. In this way the heat of the car can be controlled so as to meet the varying climatic conditions.

It will, of course, be understood that the alcohol is carried up by capillary attraction, by means of the wicks, to the perforated burners, and is consumed in flames at the small openings 21. It is necessary, however, to have heat for the vaporization of such alcohol, and when the stoves are first started up, a supply of alcohol is poured into the saucers or cups 30 beneath each of the burners, and lighted, so that the heat thereof heats the copper tubes sufficiently to cause the vaporization of the alcohol, such vapor escaping through the apertures 21. As soon as this vaporization has been well started, the burners can be lighted, and due to the heat generated by their own flames, this vaporization of the alcohol will continue automatically, the cups 30 being used only for a preliminary starting operation.

I direct attention to the fact that the car proper and the housing for the stove or heater form a substantially airtight compartment, and that because of the use of alcohol I am enabled to carry on the operation of the stove indefinitely with the admission of only a slight amount of oxygen or outer air, and that by the employment of alcohol the moisture in the car is not abstracted and the air is not dried sufficiently, if at all, to detrimentally or injuriously affect the fruit or vegetables carried.

In Fig. 1, I have not shown the entrance of the heated air to the interior of the body of the car, since that takes place at the end of the car, but it is to be understood that the air in the car is kept in rotation, passing to the stove, being heated thereby, being conducted to the interior of the car, where it becomes cooled again, subsequently passing downwardly to the stove for reheating. It will be apparent therefore that by my improved device I am enabled to provide a car of this character with a heater which can be relied upon, which will not become extinguished by motion of the car, and which will maintain the lading in proper and satisfactory condition without injury as to quality. It will also be obvious that the amount of heat applied to the car can be readily gov-

erned, and can be predetermined when the car is sent on its journey by the proper setting of the valves controlling the admission of the alcohol from the reservoir compartment to the liquid chambers of the stove.

Although I have described this form of alcohol stove or heater in connection with a railway car, I wish to have it understood that its use is not at all limited and restricted to this particular application, since a heater of this kind may be employed in many other relations, as for heating rooms, in chafing dishes and the like.

Any of the other ordinary fuels, such as coal, kerosene oil, gas, gasolene and the like, require a considerable amount of free air to support combustion, making it necessary to consume an extra amount of fuel to heat this free or additional air to maintain the desired temperature inside of the car, but owing to the fact that alcohol more nearly supports its own combustion than any other of the fuels commonly used for heating cars, and the burning of such alcohol does not tend to dry out the air, it will be obvious to those skilled in this art that a stove of this kind is particularly economical in the consumption of fuel, and will heat the car sufficiently without causing a drying out or withering of the vegetables, as would occur with other kinds of fuel.

It will be apparent to those skilled in the art that many changes could be made in the detailed construction of the parts which I have described without departing from the spirit or scope of my invention.

I claim:

1. In a heater, the combination of a plurality of chambers adapted to contain the liquid to be consumed, burners for said chambers, a liquid reservoir compartment inclosing said chambers, and independent means to establish and break communication between said reservoir compartment and liquid chambers, substantially as described.

2. The combination of a heater having a reservoir compartment and liquid chambers within said compartment, valves adapted to establish and break connection between said compartment and chambers, actuating means for said valves protruding from the heater, and a frame about said heater acting to prevent damage to said valve-actuating means, substantially as described.

3. A heater comprising a liquid reservoir, a plurality of fuel compartments within said reservoir, a burner connected with each of said compartments, and means for selectively connecting any of said chambers with said reservoir, substantially as described.

4. A heater comprising a plurality of fuel chambers, a perforated and inverted U-shaped tube connected with each of said chambers, means for conducting liquid fuel within each of said chambers to said tube, a fuel reservoir, and means for selectively connecting said reservoir with any of said chambers, whereby fuel may be supplied to the latter, substantially as described.

5. A heater comprising a liquid reservoir, a plurality of fuel chambers within said reservoir, means for independently and selectively connecting any of said chambers with said reservoir, a burner associated with each of said chambers, and vent means leading from each of said chambers, substantially as described.

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