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HEATING STOVE

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Fig. 1.

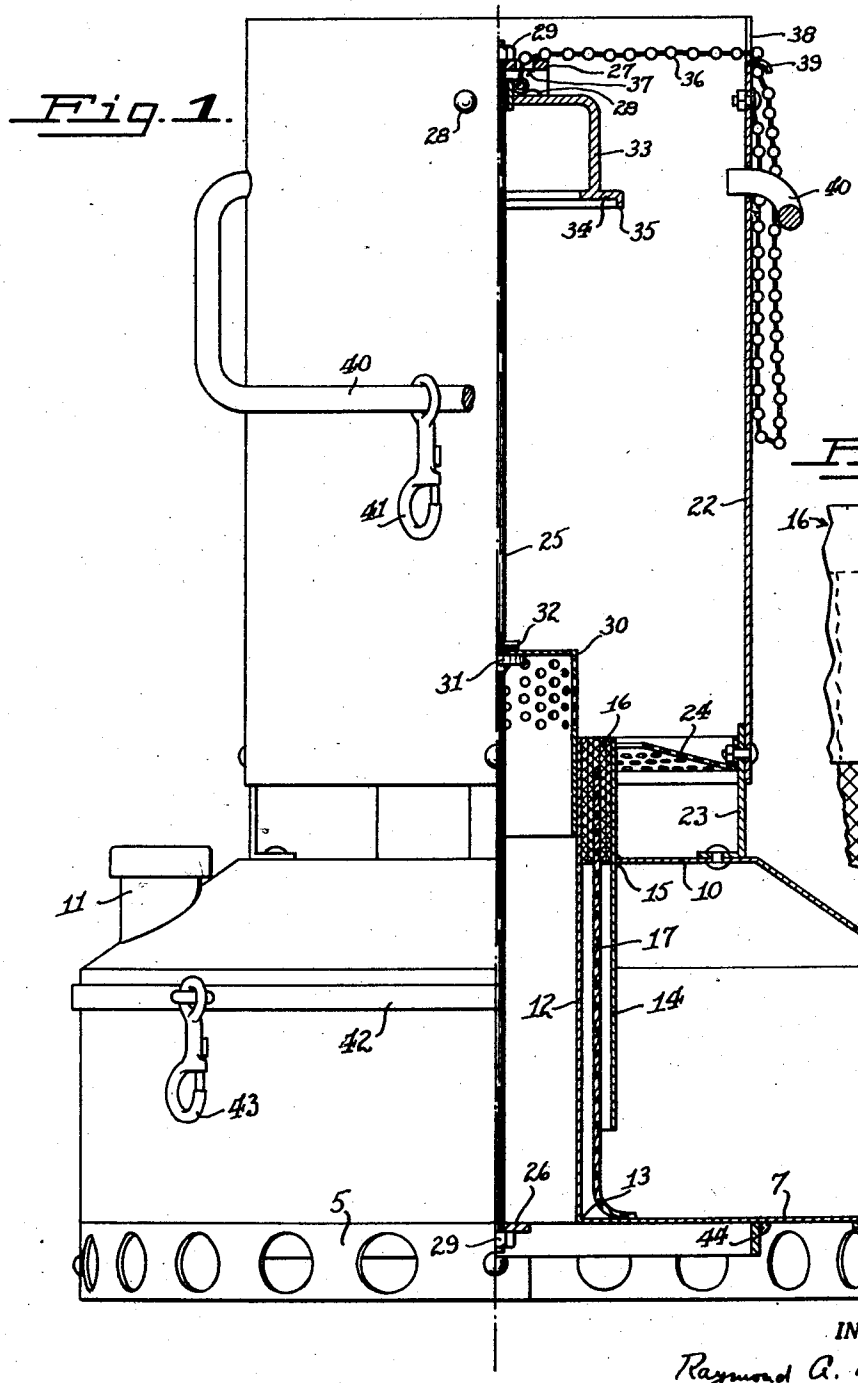
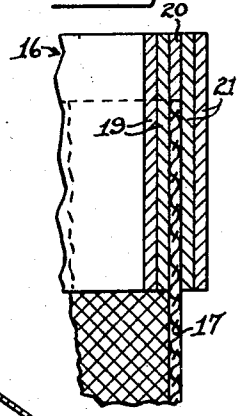


Fig. 2.



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HEATING STOVE

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4 Claims. (Cl. 126—96)

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The present invention relates to a heating stove adapted to burn liquid fuel, of the type used for heating railway refrigerator cars in winter to protect food products from freezing.

Stoves of this type are commonly placed in the empty ice bunkers of the car, and set up a circulation of warm air sufficient to keep the entire car above the critical temperature.

Alcohol is the preferred fuel for such stoves, because it leaves no odor to contaminate the food products in the car, makes no smoke, and gives off no poisonous gases when burned, which, if present in a tightly closed car, would be dangerous to men entering for inspection or other servicing.

The objects of the invention are to provide a portable convection type circulating heater especially adapted to burn alcohol, which has a long life and requires no attention or servicing other than to refill it with fuel; which burns the fuel at a constant predetermined rate not subject to adjustment and not affected by the movement of the car; which is simple and rugged in construction and is provided with easily operated devices for securely anchoring it to the lining of the ice bunker; and which can be stacked for storage or shipment when not in use.

Other objects and advantages will become apparent from the following specification, which should be read with the understanding that changes, within the scope of the claims hereto appended, may be made in the form, proportion and arrangement of the several parts herein illustrated and described, without departing from the spirit of the invention.

In the drawings, Fig. 1 is a part sectional side view of a preferred embodiment of my improved heater.

Fig. 2 is a sectional detail of the wick.

Referring in more detail to the drawings, the numeral 5 designates a base preferably formed as a ring having air vent apertures therein. A cylindrical fuel tank 6 having a flat bottom 7 is mounted on said base by means of angle brackets 8. The sides of said tank are inclined inwardly in conical form near the top as at 9, and the top itself is flat and horizontal as at 10. A filler spout 11 with a suitable closure is provided in the conical portion of the tank.

An open ended tube 12 extends vertically through the center of the tank 6, and is tightly and permanently secured at 13 to the bottom 7 thereof. A larger open ended tube 14 surrounds the tube 12 coaxially, and is tightly and permanently secured at 15 to the top 10 of the tank.

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The joints 13 and 15 are liquid and gas tight to prevent leakage of fuel or fuel vapor. The bottom of the outer tube 14 is slightly above the bottom of the tank, so that fuel can freely enter the annular space between the tubes. The tops of both tubes are at the same height above the top of the tank, about two inches in the design herein shown.

The annular space between the inner and outer tubes 12 and 14 is occupied by a cylindrical wick. The upper portion or section 16 of the wick is made of noncombustible porous material, preferably woven or felted asbestos fibres, and completely fills the annular space for a distance of about two inches downwardly from the tops of the tubes. The lower portion or section 17 of the wick is made of a suitable fibrous material having good capillary power, preferably woven cotton, similar to an ordinary tubular lamp wick, and lies loosely within said annular space. The upper portion of the cotton wick 17 is permanently embedded in the asbestos wick 16, and the lower portion of said cotton wick dips into the fuel in the tank. The top of the asbestos wick 16 is level with the tops of the tubes between which it is held.

The function of the asbestos section of the wick, which may be termed the primary wick, is to feed the fuel to the flame, which burns at or slightly above the top of said wick. The capillary action of asbestos is comparatively small, much less than cotton, so the cotton or secondary section of the wick is used to conduct the fuel from the tank to the primary asbestos wick. With the described combination of primary asbestos wick and secondary cotton wick, an ample supply of fuel is fed to the flame, regardless of the level of the fuel in the tank, while the upper end of the wick, exposed to the heat of the flame, is not consumed or even charred, and lasts without attention for the life of the heater. The rate of fuel consumption is constant, and is determined by the extent to which the cotton wick is embedded in the asbestos wick. The outer wick holding tube 14 extends far enough down into the tank so that splashing of the fuel is not communicated to the annular wick space, and does not affect the rate of absorption of the wick.

The composite wick described above may be formed in any suitable manner. I have found, however, that a wick made as shown in Fig. 2 is satisfactory. Woven asbestos tape, say two inches wide, is wound for two turns 19 around a mandrel, not shown; then the end portion of the tubular cotton wick 17 is drawn over the layers of asbestos for the desired distance, and a single

layer 20 of narrow asbestos tape is wound at the end of the cotton as a filler ring; then two more layers of two inch asbestos tape are wound around over the cotton and the filler strip, as shown at 21, and the whole is suitably tied or stitched, in any manner, not shown, to hold it in place. The outside diameter of the mandrel upon which the wick is wound is such that it will fit into the inner wick holding tube 12, so that the completely formed wick can be slid off the mandrel directly on to said wick tube.

A cylindrical chimney 22, Fig. 1, preferably made of sheet steel suitably rust-proofed, is mounted above the tank 6 and secured to its top 10 by angle brackets 23. The bottom of the chimney is spaced about one inch above the top of the tank, to prevent free entry of air and to allow room to insert a match to light the flame. An annular perforated baffle 24, preferably slightly conical as shown, extends inwardly from the wall of the chimney at about the level of the top of the burner, i. e. at the level of the tops of the wick and wick tubes. The inner edge of said baffle is spaced from the outer wick tube by about three quarters of an inch.

A vertical rod 25 extends centrally through the wick tube 12 and chimney 22. Its lower end passes through a spider or bridge 26 extending horizontally across the lower end of the wick tube and bearing against the bottom of the tank, and its upper end passes through a cross bar 27 placed slightly below the top of the chimney and bolted thereto at each end as shown at 28. Nuts 29 at both ends of the rod 25 hold it securely in place.

A flame spreader 30, formed as a cylinder with perforated sides and a solid top, fits within the upper end of the inner wick tube 12 and projects above it. The rod 25 passes through the top of said flame spreader and holds it in position by means of a lug or collar 31 below said top and a key 32 above it.

Primary air for combustion of the fuel reaches the flame zone through the inner wick tube 12 and perforated spreader 30, and secondary air enters through the space between the bottom of the chimney 22 and the top of the tank. The secondary air, which is greatly in excess of the amount needed for combustion, is driven upwardly through the chimney by the heat of the flame, carrying off the products of combustion and creating air currents which circulate throughout the car. The cold air entering the chimney from its bottom passes over the top and sloping sides of the fuel tank, keeping said tank cool, and preventing overheating of the fuel. Cold air passing up through the wick tube 12 also assists in preventing overheating of the fuel.

A movable wick cover or cap 33 is mounted to slide on the rod 25, and has a horizontal flange 34 which fits closely over the top of the wick and the top of the two wick tubes. The height and inner diameter of said cap are such that it fits over the flame spreader 30 without interference, and it has an annular depending lip 35 at the periphery of its horizontal flange 34, said lip fitting over and around the outer wick tube. The cap 33 is raised and lowered by a chain 36, said chain passing through a hole 37 in the cross bar 27 and through a hole or notch 38 in the chimney. The outer end of said chain is fastened to the chimney, and a hook 39 is provided, over which a link of the chain is looped to hold the cap in upper position, as shown. The cap

33, when lowered upon the wick, snuffs out the flame, and also protects said wick, when the heater is not in use, from dust and dampness, and prevents evaporation of fuel therefrom.

The heater is provided with a carrying bale 40, whose ends are swiveled in holes formed in the chimney 22 below the level of the cross bar 27. A spring snap hook 41 is mounted on said bale, to be hooked on to the screen lining of the ice compartment of a refrigerator car, or to any other suitable support, for the purpose of holding the heater steady and preventing it from shifting or tipping over due to jolting of the car. A reinforcing band 42 surrounds the fuel tank, and two snap hooks (one being shown at 43) are secured to said band, for the same purpose as the hook 41. All three hooks 41 and 43 are in the same vertical plane when the bale 40 is extended horizontally, so that they can all be engaged with the vertical screen lining of the ice compartment. With the heater thus anchored to a fixed support at three points, it is adequately held against shifting or tipping. The snap hooks provide readily operated detachable anchoring means.

An annular downwardly projecting flange 44 is secured to the bottom 7 of the fuel tank. The inside diameter of said flange is such that it will fit over the top of the chimney 22 when one heater is stacked upon another for storage or shipment, and thus prevents shifting. It will be seen that the chain and other top accessories are located slightly below the top of the chimney so that said chimney presents a smooth upper end for engagement by the stacking flange 44 of a superposed heater. The heaters, therefore, stack steadily and firmly one upon another.

I claim:

1. A heater adapted to burn liquid fuel comprising a fuel tank, spaced inner and outer wick holding tubes positioned vertically within said tank and extending above the top thereof, the inner wick tube extending through the bottom of said tank and forming a duct for the passage of air to the flame, a wick housed in the space between said tubes, a chimney rising above said tank and secured thereto, transverse bridge members positioned respectively across the lower end of the inner wick tube and the upper portion of said chimney, a vertical rod supported by said bridge members and positioned centrally within said inner wick tube and said chimney, a flame spreader fitted within the upper end of said inner wick tube and rising above it, said flame spreader having apertures for the passage of air to the flame, and means for supporting said flame spreader upon said rod.

2. A heater adapted to burn liquid fuel comprising a fuel tank, spaced inner and outer wick holding tubes positioned vertically within said tank and extending above the top thereof, the inner wick tube extending through the bottom of said tank and forming a duct for the passage of air to the flame, a wick housed in the space between said tubes, a chimney rising above said tank and secured thereto, transverse bridge members positioned respectively across the lower end of the inner wick tube and the upper portion of said chimney, a vertical rod supported by said bridge members and positioned centrally within said inner wick tube and said chimney, a wick cover slidably mounted on said rod within said chimney, said wick cover having a flange formed to fit closely over the top of the wick and the tops of

said wick tubes, and means for raising and lowering said wick cover upon said rod.

3. A heater adapted to burn liquid fuel comprising a fuel tank, spaced inner and outer wick holding tubes positioned vertically within said tank and extending above the top thereof, the inner wick tube extending through the bottom of said tank and forming a duct for the passage of air to the flame, a wick housed in the space between said tubes, a chimney rising above said tank and secured thereto, transverse bridge members positioned respectively across the lower end of the inner wick tube and the upper portion of said chimney, a vertical rod supported by said bridge members and positioned centrally within said inner wick tube and said chimney, a wick cover slidably mounted on said rod within said chimney, said wick cover having a flange formed to fit closely over the top of the wick and the tops of said wick tubes, a chain having one end attached to said wick cover, and retaining means positioned exteriorly of said chimney for separable engagement with said chain to hold the wick cover in elevated position.

4. A heater adapted to burn liquid fuel comprising a fuel tank, spaced inner and outer wick holding tubes positioned vertically within said tank and extending above the top thereof, the inner wick tube extending through the bottom of said tank and forming a duct for the passage of air to the flame, a wick housed in the space between said tubes, a chimney rising above said tank and secured thereto, transverse bridge members positioned respectively across the lower end of the inner wick tube and the upper portion of said chimney, a vertical rod supported by said bridge members and positioned centrally within said inner wick tube and said chimney, a flame spreader fitted within the upper end of said inner wick tube and rising above it, said flame spreader having apertures for the passage of air to the flame, a wick cover slidably mounted on said rod within said chimney, said cover comprising an inverted cup shaped portion fitting over said flame spreader and a flange at the lower edge of said cup shaped portion formed to fit closely over the upper ends of the wick and the wick tubes.

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