Nov. 28, 1950 H. E. KIMBLE 2,532,234

PORTABLE ELECTRIC REFRIGERATOR

Filed May 3, 1947 2 Sheets-Sheet 1

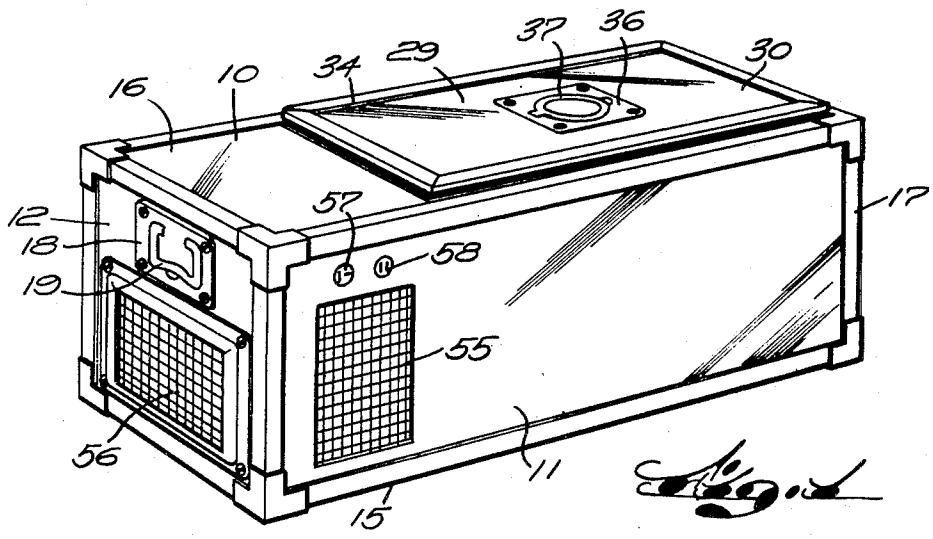


Fig. 1

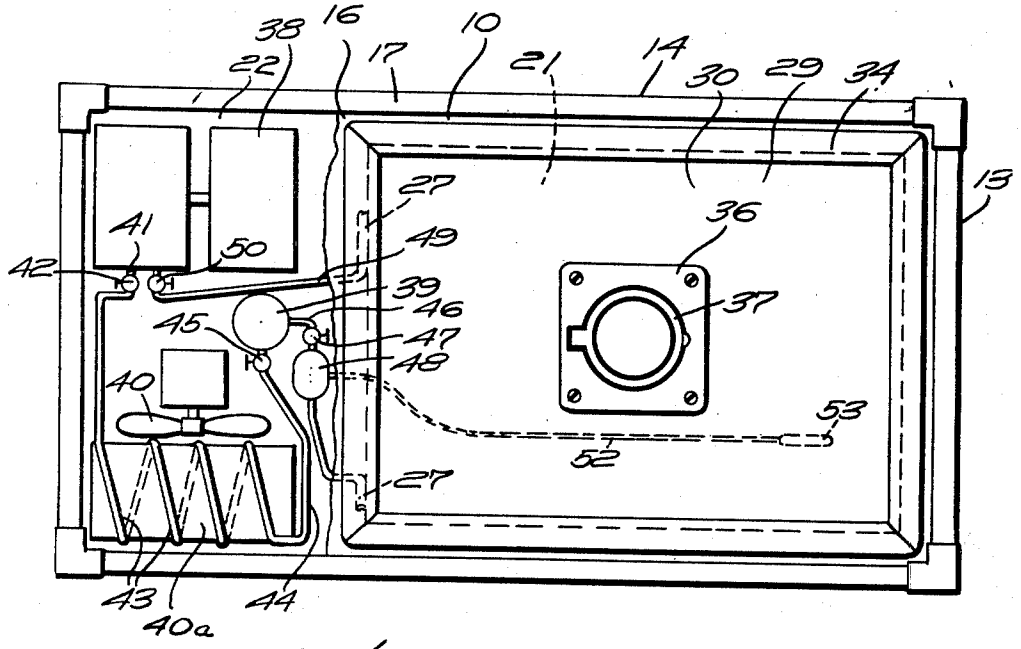


Fig. 2

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PORTABLE ELECTRIC REFRIGERATOR

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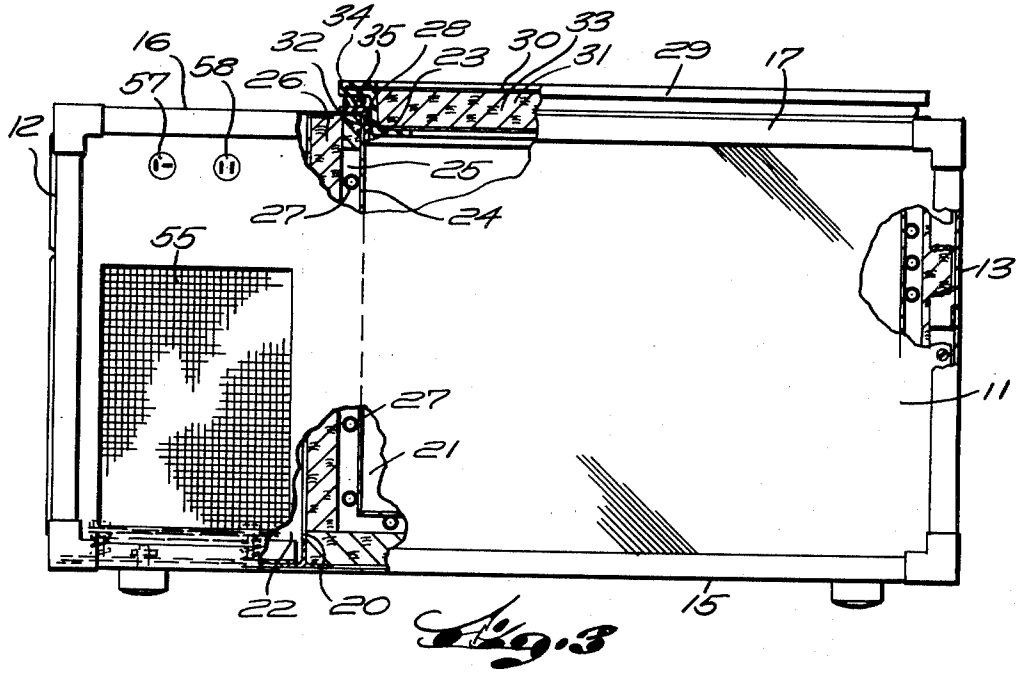


Fig. 3

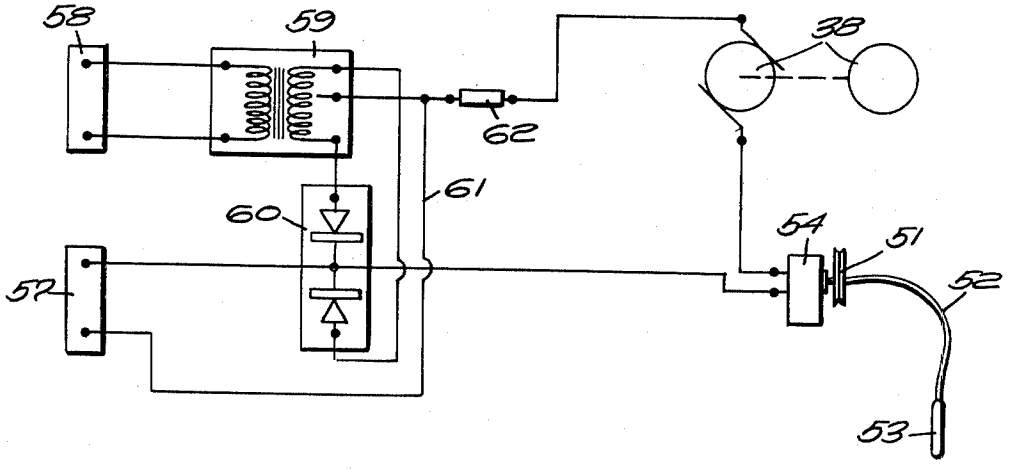


Fig. 4

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# UNITED STATES PATENT OFFICE

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## PORTABLE ELECTRIC REFRIGERATOR

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Application May 3, 1947, Serial No. 745,821

1 Claim. (Cl. 62—116)

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The present invention relates to a refrigerating apparatus, and has particular reference to a portable electric refrigerator which is compact and may be readily carried in automobiles, boats, airplanes, and the like.

The principal object of the invention is to provide a light weight compact portable electric refrigerator which provides a maximum cooling space.

Another object of the invention is to provide a portable electric refrigerator which can operate on house current or on battery current.

An additional object of the invention is to provide operating mechanism for a portable electric refrigerator which will maintain a desired low temperature in the storage or cold compartment.

A further object of the invention is to provide a cold compartment in a portable refrigerator which has cooling coils mounted in direct heat absorbing relation to the cold compartment walls.

With the above and other objects and advantageous features in view, the invention consists of a novel arrangement of parts more fully disclosed in the detailed description following, in conjunction with the accompanying drawings, and more specifically defined in the claim appended thereto.

In the drawings:

Fig. 1 is a perspective view of an illustrative electric refrigerator which embodies the invention;

Fig. 2 is a top plan view, a portion of the upper wall being removed to disclose the operating mechanism;

Fig. 3 is a front elevation, parts being broken away to disclose the cold compartment construction; and

Fig. 4 is a diagrammatic layout of the temperature control and electrical connections.

It has been found desirable to provide a light weight electric refrigerator of small size which may be carried between the front and rear seats or in the rear trunk of an automobile or in a boat, plane, or the like. The operating mechanism is designed to be centrally operated on house current and then operated on battery current, the mechanism being automatically responsive to changes in temperature in the cold compartment for maintaining a desired refrigeration. To this end, I have devised a very efficient cold compartment and I have arranged cooling mechanism therefor which is so compact and efficient that efficient refrigeration is provided for trips and for extended travel, such refrigeration being particularly desirable when the travellers include infants.

The drawings illustrate a preferred construction for a portable electric refrigerator, comprising a cabinet 10 having a front wall 11, side walls 12, 13, a rear wall 14, a bottom wall 15, and a top wall 16. The body is preferably of aluminum sheets secured to aluminum angle framework by resetting or by self-tapping screws, and may if desired have a stainless steel angle molding 17 around the edges. The side walls 12, 13 are preferably provided with handle plates 18 and swing handles 19, and the bottom wall may, if desired, be provided with support feet of rubber or the like.

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A metal partition 20, see Fig. 3, divides the cabinet into a cold compartment 21 and a mechanism compartment 22. The cold compartment has an open top 23 and an inner metal liner 24 which is spaced in the front, rear, bottom and side walls to provide a space 25 which is lined with insulating material 26, the preferred insulating material being cork or Celotex. Cooling coils 27 of copper tubing are mounted in the space 25, and are preferably securely soldered to the inner metal liner 24 to obtain maximum heat transfer, and the free space between the cooling coils may also be filled with insulating material if desired. The soldering connection produces quicker cooling and longer lasting low temperatures, thus reducing the demand on a car battery, for example, and the cooling compartment is completely free from coils and is easily kept clean.

The upper edges of the open top 23 of the cold compartment are preferably provided with a phenolic molding 28, and a removable cover 29 has an upper portion 30 larger than the open compartment top and extending over the molding 28, the body 31 of the cover having tapered edges 32; the body includes insulation 33 of cork or Celotex, and the edges of the upper portion and the tapered edges 32 are covered with a phenolic molding 34, a rubber gasket seal 35 provided between the moldings 28 and 34 to cooperate with the moldings to break frost creepage. The cover is provided with a handle plate 36 equipped with a swivel handle 37.

The mechanism compartment 22 houses a combination high frequency motor-compressor unit 38 which is preferably ½ H. P., a refrigerant reservoir 39, an electric fan 40, and a condenser 40a, as well as the control mechanism therefor. The preferred motor-compressor unit is of the 6 volt diaphragm type such as disclosed in United States Patent No. 2,169,862, although any suitable 6 volt commercial motor-compressor may be utilized. The compressor unit 38 has an outlet conduit 41, controlled by a manually settable valve

42, which communicates with a series of coils 43 which are positioned in the condenser 40a, the refrigerant passing from the condenser through a conduit 44, which has a manually settable control valve 45, to the refrigerant reservoir 39.

The fluid from the reservoir 39 is communicated with the cooling coils 27 by a conduit 46, which is provided with a manually settable valve 47, and a thermostatic control valve 48. Return flow from the cooling coils 27 passes through a conduit 49 to the motor compressor unit, the conduit 49 having a manually settable valve 50, whereby a closed refrigeration fluid circuit is provided for obtaining a controlled periodic flow.

The thermostatic control valve 48 is opened and closed by a Sylphon bellows actuator 51, see Fig. 4, operated by thermostatic expansible fluid through a conduit 52 from a thermostatic bulb 53 positioned in the cold compartment, the Sylphon bellows actuator also simultaneously controlling a normally open micro-switch 54 in the motor compressor circuit, by closing the micro-switch when the cold compartment temperature rises, and returning it to open condition when the temperature falls to the desired low. The fan operates to inflow cooling air through a grill 55 in the front wall 11 of the box, to pass over the condenser and to exit through a removable grill 56 in the side wall 12. The operating mechanism may be mounted on a spring support base (not shown) if desired.

Two contact sockets 57, 58 are provided, the socket 57 providing a direct connection from the auto battery to the 6 volt high frequency motor compressor; the socket 58 connects a 110 volt lighting circuit to the transformer 59 through the rectifier 60, the wiring 61 including a standard type safety fuse 62.

The above described construction provides a very efficient portable refrigerator which has a relatively large cold compartment. For example, a cabinet 28" x 14" x 15" will provide a compressor compartment 8" x 14" x 15", and will maintain a minimum cold compartment temperature of 25° F. The preferred fluid for the refrigerant is Freon, and for the thermostat assembly is xylene, and the preferred temperature for causing operation of the cooling mechanism is 39° F.

The amperage required for a system of the character described is low, and the system may



be economically and efficiently operated on ⅓ H. P. motor of 60 watts or less. The total weight of the refrigerator as described may be kept at less than twenty-five pounds, thus providing a very light weight portable construction.

Although I have described a specific embodiment of my invention, it is obvious that changes in the size, arrangement, and operation of the parts may be made to suit the requirements for different portable refrigerator designs, without departing from the spirit and scope of the invention as defined in the appended claim.

I claim:

In a portable electric refrigerator, a cabinet having side walls, end walls, a bottom wall and a top wall, an insulated partition intermediate the end walls and dividing the cabinet into a cold compartment and a mechanism compartment, said mechanism compartment containing a motor compressor unit, a refrigerator reservoir, a condenser, and cooling coil connections from the compressor unit to the condenser, to the reservoir and back to the compressor unit, providing a closed circuit cooling system, said cold compartment having a metal inner liner spaced from the walls thereof, the cooling coils from the compressor unit extending into the cold compartment within the space between the metal liner and the walls, said cooling coils being soldered to the metal liner and said space being filled with insulation, the top wall of said cabinet having an opening above the cold compartment, and an insulated cover removably closing said opening, said motor compressor unit including a power circuit having a battery connection and an alternating power connection in parallel, the alternating power connection including a transformer and a rectifier.

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