Sept. 4, 1951 R. WINGERTER 2,566,865

PORTABLE REFRIGERATOR

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Fig. 1

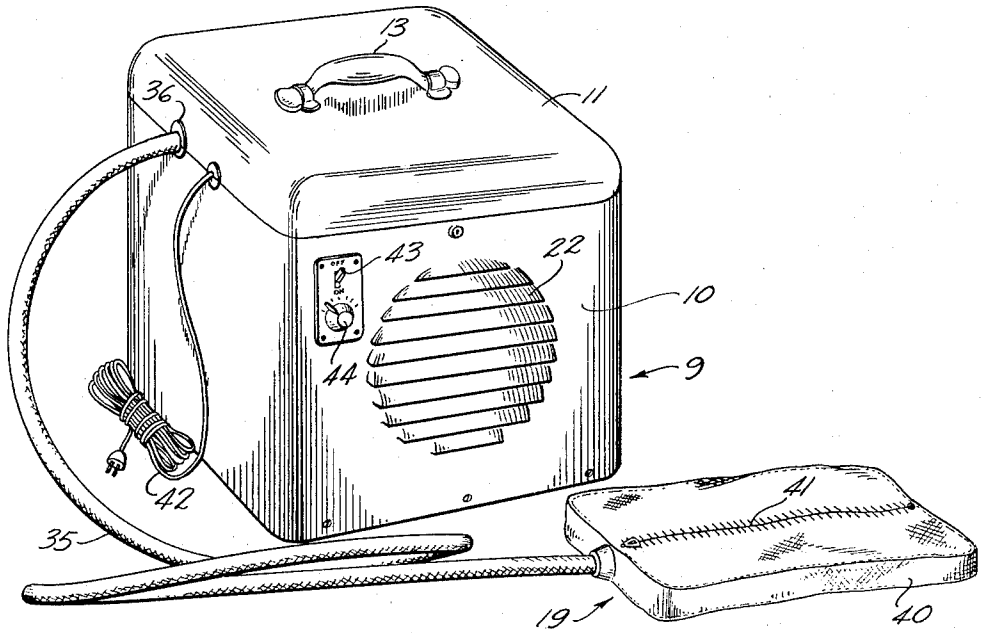


Fig. 2

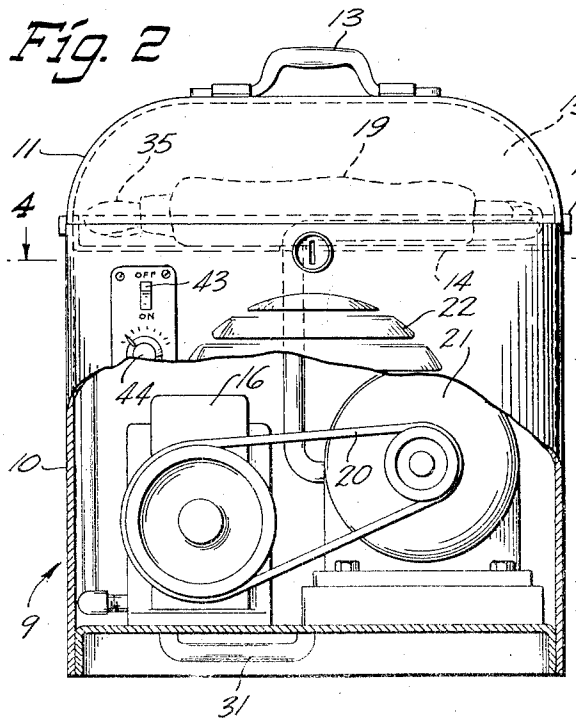
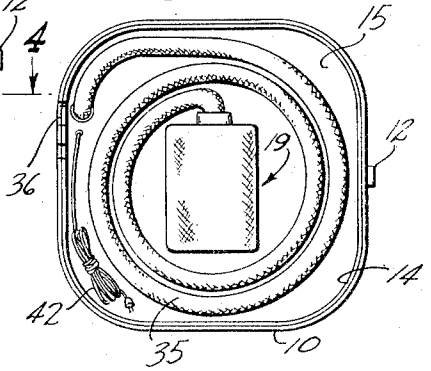


Fig. 3



INVENTOR.
Ralph Wingerter
BY
Elroy J. Wutschel
Attorney

Sept. 4, 1951 R. WINGERTER 2,566,865

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Fig. 4

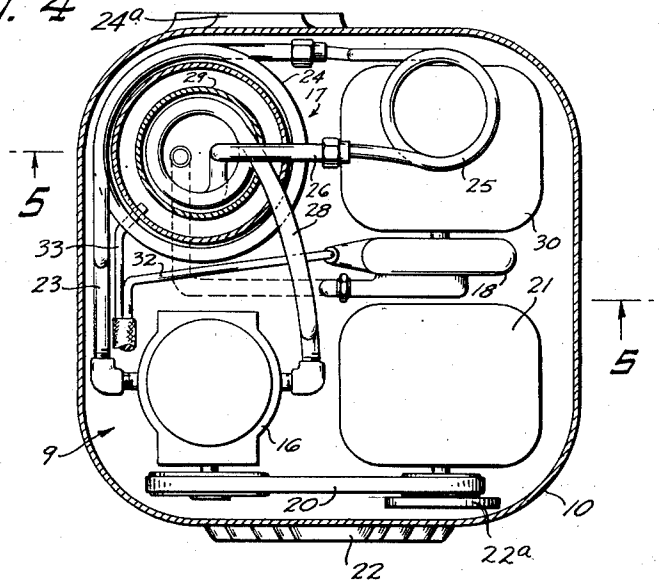
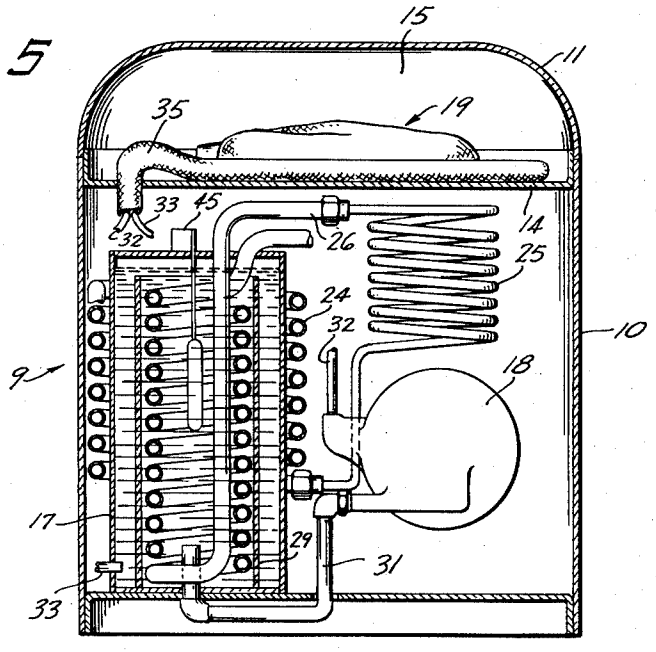


Fig. 5



INVENTOR.
Ralph Wingerter
BY
Elmer J Wutschel
Attorney

Sept. 4, 1951 R. WINGERTER 2,566,865

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Fig. 6

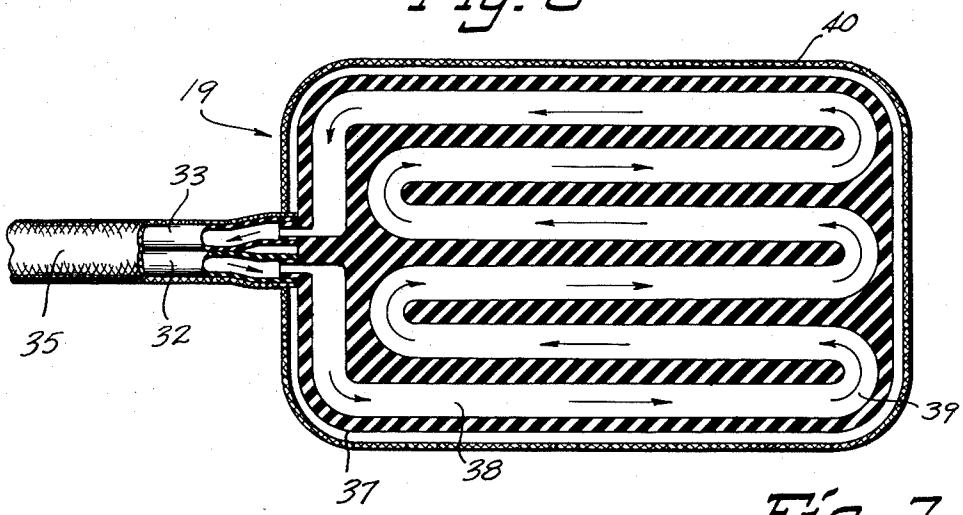
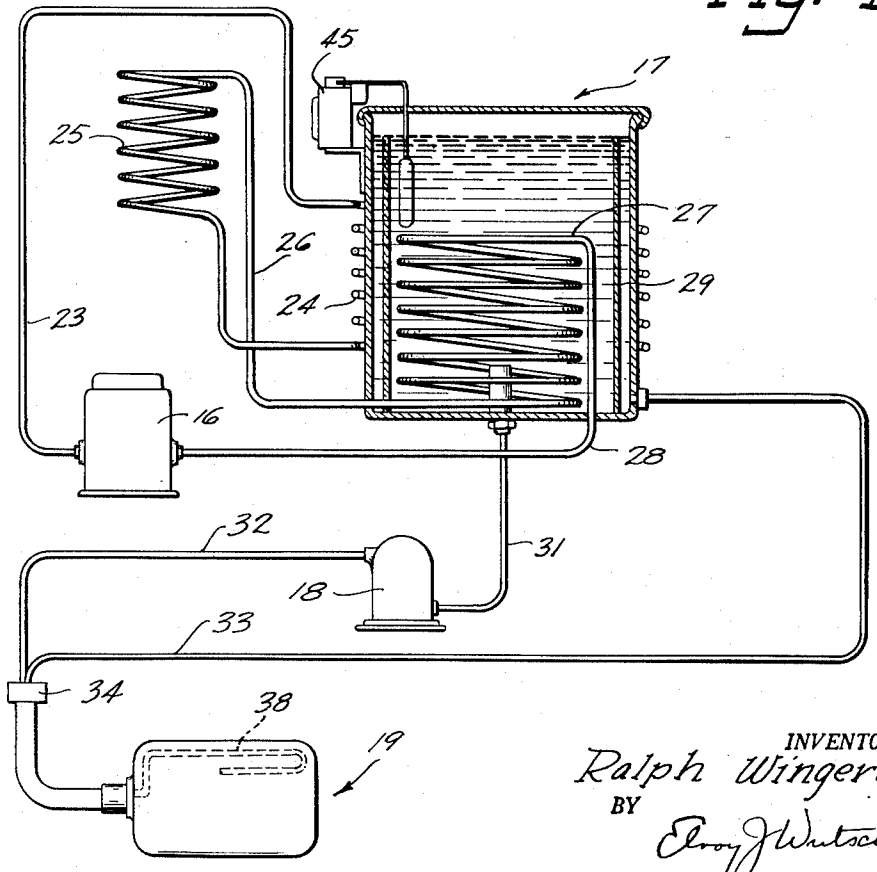


Fig. 7



INVENTOR.
Ralph Wingerter
BY
Elroy J. Wutschel
Attorney

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PORTABLE REFRIGERATOR

Ralph Wingerter, Akron, Ohio

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1 Claim. (Cl. 62—4)

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This invention relates generally to mechanical refrigerators and more particularly to portable automatic refrigerator units.

A general object of the invention is to provide a portable refrigerator unit.

Another object of the invention is to provide an improved mechanical refrigerator unit wherein a cooling element may be selectively positioned relative to the unit.

Another object of the invention is to provide an improved medical ice pack artificially maintained at a predetermined temperature.

Another object is to provide an improved means of maintaining the temperature of a cooling bath such as is used in photographic, and various chemical and manufacturing processes.

Another object of the invention is to provide an improved cooling element which is acid and corrosive resistant and, consequently, may be placed directly into acids and other solutions.

Yet another object of the invention is to provide an improved portable refrigerator unit having selectively variable automatic temperature control means.

According to this invention, a refrigerator unit is arranged to be readily portable and to have a cooling element which may be selectively positioned relative to the unit. This unit is adaptable to many chemical and industrial processes wherein it is necessary to cool small amounts of solutions or gases, or to maintain them at a predetermined temperature. The cooling element may be used in place of ice packs or bags for medical purposes. A simple control switch enables the attendant to change the effective temperature of the cooling element at will through an automatic control means associated with the unit.

The foregoing and other objects of the invention which will become more fully apparent from the following detailed specification, may be achieved by means of the particular refrigerator unit constituting an exemplifying embodiment of the invention that is depicted in and described in connection with the accompanying drawings, in which:

Figure 1 is a perspective view of a portable refrigerator unit with the cooling element disposed outside of the carrying case and embodying the features of the invention;

Fig. 2 is an end elevational view of the unit shown in Fig. 1, with part of the case broken away to show the compressor driving mechanism;

Fig. 3 is a top plan view of the case with the cover removed to show the cooling element storage compartment;

Fig. 4 is a horizontal view taken on the plane of lines 4—4 in Figs. 2 and 5, and showing the mounting of the refrigerator unit within the case;

Fig. 5 is a transverse vertical section taken substantially on the plane of the line 5—5 in Fig. 4;

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Fig. 6 is a detailed view in horizontal cross-section disclosing the construction of a cooling element more generally shown in Fig. 1 connected to the refrigerator unit; and

Fig. 7 is a schematic diagram of the refrigeratory system.

Referring more specifically to the drawings, Figs. 1 and 2 thereof show a portable refrigerator unit 9 enclosed in a metal case 10 having a hinged top cover 11 provided with a latch 12 and carrying handle 13. As best shown in Figs. 2, 3 and 5, a horizontal separator wall 14 secured in the top portion of the case 10 forms a storage compartment 15 in which certain parts of the refrigerator unit may be readily stored when not in use. Thus the entire unit is compactly contained within the case 10 and may be readily carried at the convenience of the user thereof.

The compressor type refrigerator unit 9 generally comprises a compressor unit 16, a cooler tank 17, a circulating pump 18, and a cooling element 19, as shown in Fig. 4. The various mechanisms are appropriately interconnected as will be hereinafter more fully described.

The compressor 16 is of the single-acting type, and is belt driven by means of a V belt 20 operating in conjunction with a motor 21 likewise mounted within the carrying case 10 (see Figs. 2 and 4). A louver 22 formed in the sidewall of the case 10 admits sufficient air to cool the working mechanisms of the refrigerator unit 9 with a suction fan 22A keyed to the end of the motor shaft serving to force the air into the case 10. The compressor 16 draws refrigerant from the expansion or low side of the refrigerator system, as schematically shown in Fig. 7, and compresses the refrigerant to a suitable pressure. The hot refrigerant gas is circulated via a tube 23 through a condenser coil 24 shown coiled about the outside of the insulated cooler tank 17. The condenser coil 24 serves to effectively lower the temperature of the compressed refrigerant to the point of liquification. Since the tank 17 is insulated, the heat from the coil 24 cannot be directed thereto, but rather is dissipated through a louvre 24A by the air stream created by the fan 22A. At this point, the refrigerant passes to the high side of the system. After it leaves the coil 24 at high pressure, it is circulated through a capillary tube or expansion valve 25 to the evaporating section of the refrigerator system. A conductor tube 26 carries the liquid refrigerant to an evaporator coil 27 appropriately mounted within the cooler tank 17. The refrigerant is then drawn back to the compressor 16 via a conductor 28 to complete the circuit. The cooling medium, or refrigerant, used in the circuit may be any standard type, such as sulphur dioxide, propane, or butane. It

is to be understood that the system need not necessarily be restricted to the mechanisms described, and that other chemical refrigerants may be used with equal effectiveness.

The evaporator coil 27 within the insulated cooler or brine tank 17 receives the refrigerant in a highly pressurized liquid state. As the refrigerant passes through the coil, it absorbs the latent heat of evaporation from the final refrigerating medium, in the particular case brine, contained in the tank 17. The final medium is maintained at a level within the tank to overflow a circular baffle plate 29, as shown in Figs. 4, 5, and 7. This plate serves to control the flow of liquid within the tank by confining the chilled brine solution to the central portion of the tank after it has come into contact with the evaporator coil 27. The solution is pumped from the center of the tank 17 by the circulating pump 18 which is directly driven from a motor 30. Both the pump and motor are compactly mounted within the case 10, and are connected by appropriate tubing 31.

The circulating pump 18 serves to circulate the brine solution from the tank 17 through the cooling element 19 and back to the tank. A supply line 32 carries the solution to the cooling element 19, while a line 33 returns it to the tank. A shut-off valve 34, as diagrammatically shown in Fig. 7, may be readily inserted in the lines 32 and 33 to permit disconnection of the element 19 from the rest of the circuit without losing any of the brine solution contained within either of the hose lines.

The lines 32 and 33, especially above the confines of the horizontal separator wall 14 shown in Fig. 5, are flexible in order to permit the ready placement of the cooling element 19 outside of the compartment 15. Both lines are encased in an insulating jacket or cover 35 in order to protect the flexible tubes against excessive wear or damage and to preserve the temperature of the solution flowing through them. A flexible grommet 36 intermedially disposed between the edges of the case 10 and the cover 11, as shown in Figs. 1 and 3, permits the cooling element to be placed outside of the compartment 15, and allows the cover 11 to be closed through the placement of the sheathed or covered lines therein.

The flexible tubes 32 and 33 connecting with the cooling element 19 are sufficiently long to permit the element to be easily positioned at some distance from the refrigerator unit 9. The cooling element 19, as detailedly shown in Fig. 6, comprises a fairly flat pliable molded member 37 having a single continuous passageway or channel 38 formed therein. The member 37 may be molded from natural or synthetic rubber, plastic, or other suitable material depending upon the use to which the element is to be put. Thus, if the element is to be submerged in a chemical solution or gas, the composition of the member 37 would necessarily have to be such to be completely resistant to the injurious effects of such chemicals. The tubes 32 and 33 are cemented directly to the molded member 37 in order to eliminate any possibility of leakage at this point. The brine solution enters the member passage 38 from the tube 32, and, after circulating through the single passageway, leaves via tube 33 connecting with the brine tank 17, as indicated by arrows 39. The shape and size of the cooling element may, necessarily, be changed to meet a particular application.

If the portable refrigerator is to be used in hospitals, first aid rooms, and other medical institutions to serve as mechanical ice packs, the cooling element 19 may be provided with a removable sterilized cloth bag or sack 40. A zipper or clasp device 41 (see Fig. 1) on the bag 40 will afford quick removal therefrom.

Automatic control of the refrigerator unit 9 is provided in order to insure accurate temperature control at all times while the unit is in use. The compressor motor 21 and the circulating pump motor 30 are electrically interconnected into an automatic temperature control circuit. Power for the circuit is derived by plugging in an extension cord 42 connecting therewith into any standard electrical wall outlet. A starting switch 43 and a temperature selector switch 44 are mounted on the side of the casing 10 to afford the user of means of starting the unit and of selecting an operating temperature which he desires to maintain. These switches are interconnected into the circuit, together with a thermostatic control device 45 (see Figs. 5 and 7) operably mounted on the tank 17. With this arrangement, the temperature of the final refrigerating medium in the tank 17 may be accurately controlled at all times while the unit is operating. The motors 21 and 30 are automatically energized and de-energized as the control devices dictate.

The refrigerating device disclosed herein has great utility, especially when adapted to medical, chemical or industrial uses. The number of applications in each of these fields are very numerous.

Although the foregoing description and the accompanying drawings have set forth the present invention for the most part in one exemplary mechanism, it is to be understood that the structure shown and described is intended only to be illustrative of an operative embodiment of the invention, and that it is contemplated that the various features thereof may be incorporated into other types of refrigerating systems without departing from the spirit and scope of the invention as defined in the subjoined claim.

The principles of the invention having now been fully explained in connection with the exemplifying apparatus herein set forth, I hereby claim as my invention and discovery:

A portable refrigerator unit comprising a case, a motor mounted in said case, a refrigerator unit mounted in said case and operatively driven by said motor, an automatic control means electrically connected to control the operation of said motor and the heat absorption of the refrigerator unit, a flexible refrigerator coil element operatively connected to said refrigerator unit, a storage compartment in said case designed to retain said coil element when not in use, a cover element hingedly disposed to enclose said compartment, and a carrying means attached to said cover to provide for ease of portability of said unit.

RALPH WINGERTER.

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