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REFRIGERATING SYSTEM

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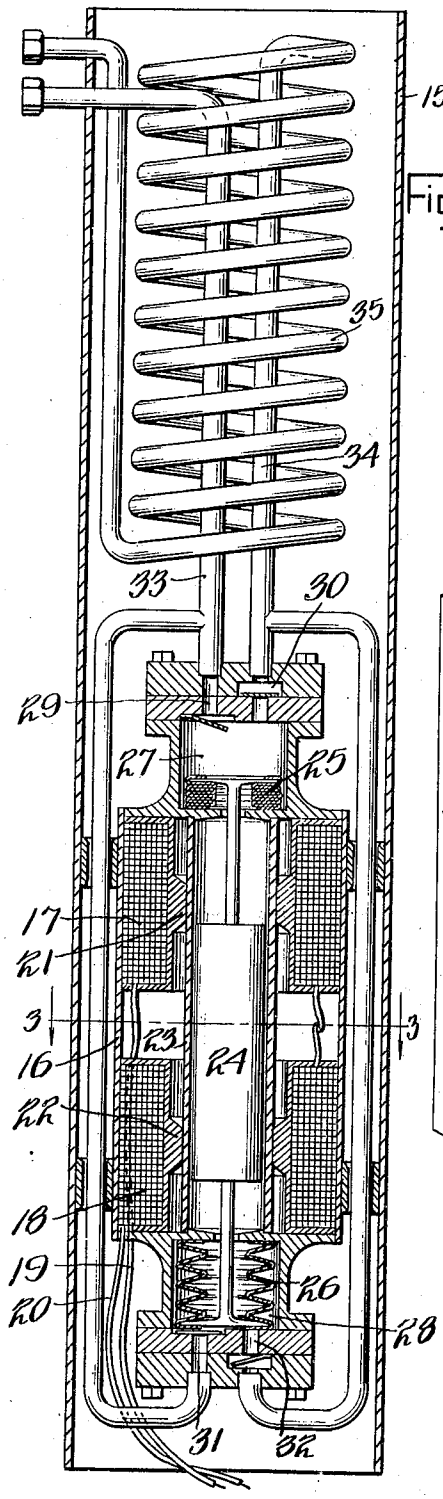


Fig. 2.

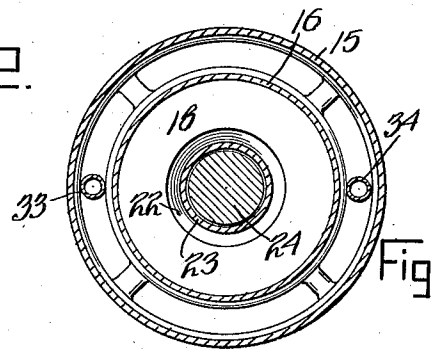
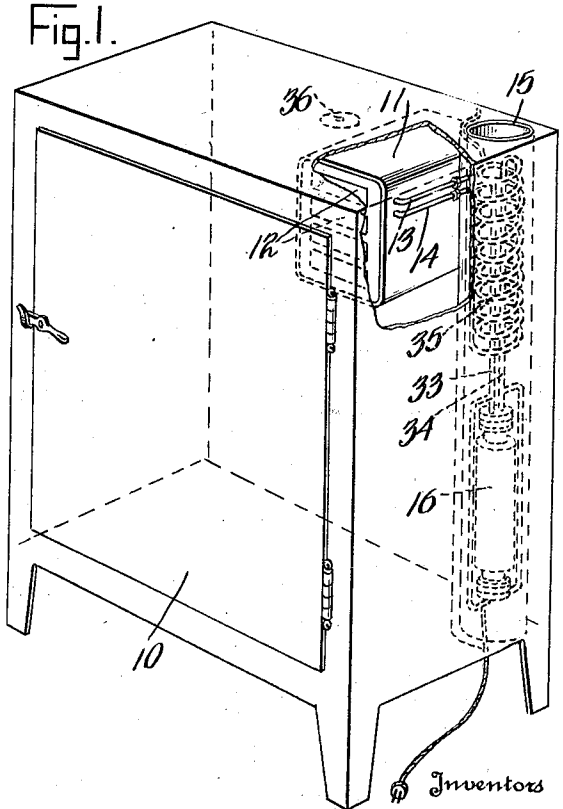


Fig. 3.

Fig. 1.



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REFRIGERATING SYSTEM

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11 Claims. (Cl. 62—115)

This invention relates to refrigerating systems and particularly to small refrigerating units which may be readily adapted to refrigerating cabinets already in use.

An object of the invention is to provide a refrigerating unit in which the leakage of gas refrigerant from the condensing coils or high pressure side into the atmosphere is prevented and particularly one which may be cheaply manufactured.

A further object of the invention is to provide a new compressor unit for refrigerators and new and improved means for operating the compressor and means which will require no lubrication.

A still further object is to provide a refrigerating unit which will be practically noiseless in operation.

Further objects and advantages will become apparent as the description proceeds.

Referring to the accompanying drawing which is made a part hereof and on which similar reference characters indicate similar parts,

Figure 1 is a view in elevation of a refrigerating cabinet showing our invention applied thereto,

Figure 2, a vertical section of the compressor and condensing unit, and

Figure 3, a section on line 3—3 of Figure 2.

In the drawing numeral 10 indicates a refrigerating cabinet of any suitable construction having an evaporating unit 11 suitably mounted therein, as for example, in one corner of the cabinet. The evaporator may contain a number of drawers 12 in which ice cubes may be frozen or in which other objects to be cooled to a relatively cold temperature may be placed.

Numerals 13 and 14 respectively indicate the pressure line and suction lines from the evaporator coil. Mounted in one corner of the cabinet is a casing 15 which is open at the bottom and at the top to provide a draft up through the casing. Within this casing is mounted a unit for compressing and condensing the refrigerant. The compressor consists of a casing 16 having suitable coil windings 17 and 18 which are connected by means of wires 19 and 20 to a source of alternating electric current. Numerals 21 and 22 respectively denote electro-magnets formed by the upper and lower coils respectively. These magnets rest against a non-magnetic sleeve 23. Within this sleeve is loosely mounted a reciprocable core 24. To the upper end of the sleeve 23 is attached a bellows 25, the upper inner end of which is connected to the upper end of the core. Similar bellows 26 is connected to the lower end of the sleeve and this bellows likewise is connected to the lower end of the reciprocable core. The bellows operate as pistons movable in pumping chambers 27 and 28 respectively. Numerals 29 and 30 indicate suction and discharge ports from the chamber 27 and 31 and 32 indicate suction and discharge ports in the chamber 28, these ports being closed by spring disk valves of any suitable construction. The ports 29 and 31 connect to the suction line 33 which is attached to the suction line 14 from the evaporator unit and the pressure ports 30 and 32 connect to a pipe 34 which leads to a condenser unit shown as a whole at 35. The condenser 35 preferably consists of a series of coils surrounding the suction line 14 which passes to the compressor. The condenser 35 is preferably cooled by air currents passing up through the sleeve or casing 15.

The plunger for the pump, as stated, is operated by alternating current, such, for example, as 60 cycle current. It will be seen therefore that the plunger makes sixty strokes per second and that no make and break circuits are required since the plunger operates in synchronism with the alternating current.

From the foregoing description it will be seen that there are no packing joints necessary since there are no movable joints or parts which pass from the refrigerant circuit to the atmosphere, the whole cabinet being hermetically sealed. It will likewise be seen that there are no parts which may become noisy and no sliding friction which necessitates lubrication. The system is air cooled by convex air currents which pass up through the casing providing a circulation of cold air through the condenser. If desired the casing 15 may be connected to the atmosphere out of the room in order to draw cold air from the outdoors and pass the warm air back to the atmosphere so as not to warm the room in which the refrigerator is placed.

While the casing 15 is shown as built into a corner of the refrigerating cabinet 10 obviously this casing could be attached to the outside of the cabinet when it is adapted to refrigerating cabinets already in use, or if desired under some circumstances the compressor condenser unit may be remotely positioned as in a basement or adjoining room. When incorporated in the cabinet or when placed outside, if desired the casing 15 may be suitably insulated from the cabinet to prevent the heated casing from transferring its heat to the walls of the cabinet. A thermostat 36 may be placed on the evaporator unit to control operation of the compressor in response to heat conditions within the refrigerator.

It will be obvious to those skilled in the art that various changes may be made in our device without departing from the spirit of the invention and therefore we do not limit ourselves to what is shown in the drawing and described in the specification, but only as indicated by the appended claims.

Having thus fully described our said invention,

what we claim as new and desire to secure by Letters Patent, is:

1. A refrigerator comprising the combination with an evaporator of a compressor, a condenser, and a motor for operating the compressor, the motor comprising a pair of wound coils, an armature reciprocably mounted within said coils and movable by and in synchronism with alternating current which is caused to pass through the coils, the compressor comprising a pair of bellows having the armature between them and a casing enclosing the condenser, compressor and motor, the condenser being positioned in the uppermost portion of the casing and in axial alignment with the compressor and motor units whereby heat generated by the compressor and the motor will cause the air to pass upwardly through the casing to cool the condenser, substantially as set forth.

2. In a refrigerator having a casing and an evaporator positioned therein, a vertical tube secured to said casing and a compressor and a condenser of substantially uniform size and in vertical alinement in said tube and connected to said evaporator, whereby the heat radiated by the compressor and condenser induces a circulation of cooling air currents through said tube.

3. In a domestic refrigerator comprising an insulated food compartment and a mechanical refrigerating system, a relatively long narrow cylindrical flue open at the top and bottom and disposed in upright position in said cabinet and extending substantially from the top to the bottom thereof, a compressor and condenser in said flue axially aligned and one above the other, the condenser being relatively long, narrow, vertically disposed in said flue, presenting its heat exchange surface to the ambient in said flue, an evaporator in said food compartment, said evaporator being operatively connected to said compressor and condenser.

4. In a domestic refrigerator comprising an insulated food compartment and a mechanical refrigerating system, a relatively long narrow cylindrical flue open at the top and bottom and disposed in upright position in said cabinet and extending substantially from the top to the bottom thereof in one corner of said cabinet, a compressor and condenser in said flue axially aligned and one above the other, the condenser being relatively long, narrow, vertically disposed in said flue, presenting its heat exchange surface to the ambient in said flue, an evaporator in said food compartment, said evaporator being operatively connected to said compressor and condenser.

5. A refrigerator comprising a cabinet, an evaporator in said cabinet, a compressor condenser unit in said cabinet, a sleeve forming a casing for said motor compressor unit, a second sleeve having inlet and discharge ports in its bottom and top respectively and forming a cylinder, a plunger movable therein and operable by alternating current to produce a stroke of the piston at each change in the direction of the current, the condenser being cooled by air flow induced by heat from the compressor condenser unit.

6. In a refrigerator having an evaporator positioned therein, a condenser controlled unit comprising a double acting floating piston pump, the piston operating in synchronism with alternating current to produce a stroke of the piston at each change in the direction of the current, an upright tube open at its top and bottom and encasing the compressor and condenser whereby heat therefrom will cause circulation of air up the tube to cool the parts.

7. A compressor condenser unit for a refrigerating system operatively connected in a manner to provide a relatively long assembly of small transverse cross section, a relatively long sleeve enclosing said unit and forming a flue to cool the unit by a draft of air induced by heat emitted therefrom, said unit and sleeve being of such relative configurations and so arranged that the unobstructed transverse cross section of said sleeve is substantially uniform throughout its length.

8. A compressor condenser unit for a refrigerating system operatively connected in a manner to provide a relatively long assembly of small transverse cross section, a relatively long sleeve enclosing said unit and forming a flue to cool the unit by a draft of air induced by heat emitted therefrom, said unit and sleeve being of such relative configurations and so arranged that the unobstructed transverse cross section of said sleeve is substantially uniform throughout its length, the elements forming said unit being disposed in axial alignment.

9. A compressor condenser unit for a refrigerating system operatively connected in a manner to provide a relatively long assembly of small transverse cross section, a relatively long sleeve enclosing said unit and forming a flue to cool the unit by a draft of air induced by heat emitted therefrom, said unit and sleeve being of such relative configurations and so arranged that the unobstructed transverse cross section of said sleeve is substantially uniform throughout its length, said unit and sleeve being constructed as an independent assembly.

10. A refrigerator unit comprising a motor and compressor, a housing for said motor and compressor, a sleeve for said unit arranged substantially concentrically of said housing, means providing an elongated condensing passage within said sleeve spaced from said motor and compressor, said sleeve and housing defining a flue therebetween of sufficient cross section to provide air flow induced by the heat emitted to cool to condensing temperature, said housing and sleeve being so proportioned and arranged that the flue space between the same is substantially uniform in cross section throughout its length.

11. In a refrigerator, a motor and a compressor operatively arranged in substantially vertical alignment, a substantially cylindrical casing surrounding the motor and compressor and spaced therefrom to provide a flue open at the top and bottom for a draft of air induced by heat emitted from the motor and compressor, and a condenser in said casing operatively connected to the compressor and spaced therefrom and located to be directly subjected with the motor and compressor to the cooling effect of said induced draft, the motor, compressor, condenser and casing forming a self contained unit.

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