Oct. 18, 1949. O. V. SAUNDERS 2,485,115

REFRIGERATING APPARATUS HAVING CONDENSATE COLLECTING MEANS

Filed July 19, 1946 2 Sheets-Sheet 1

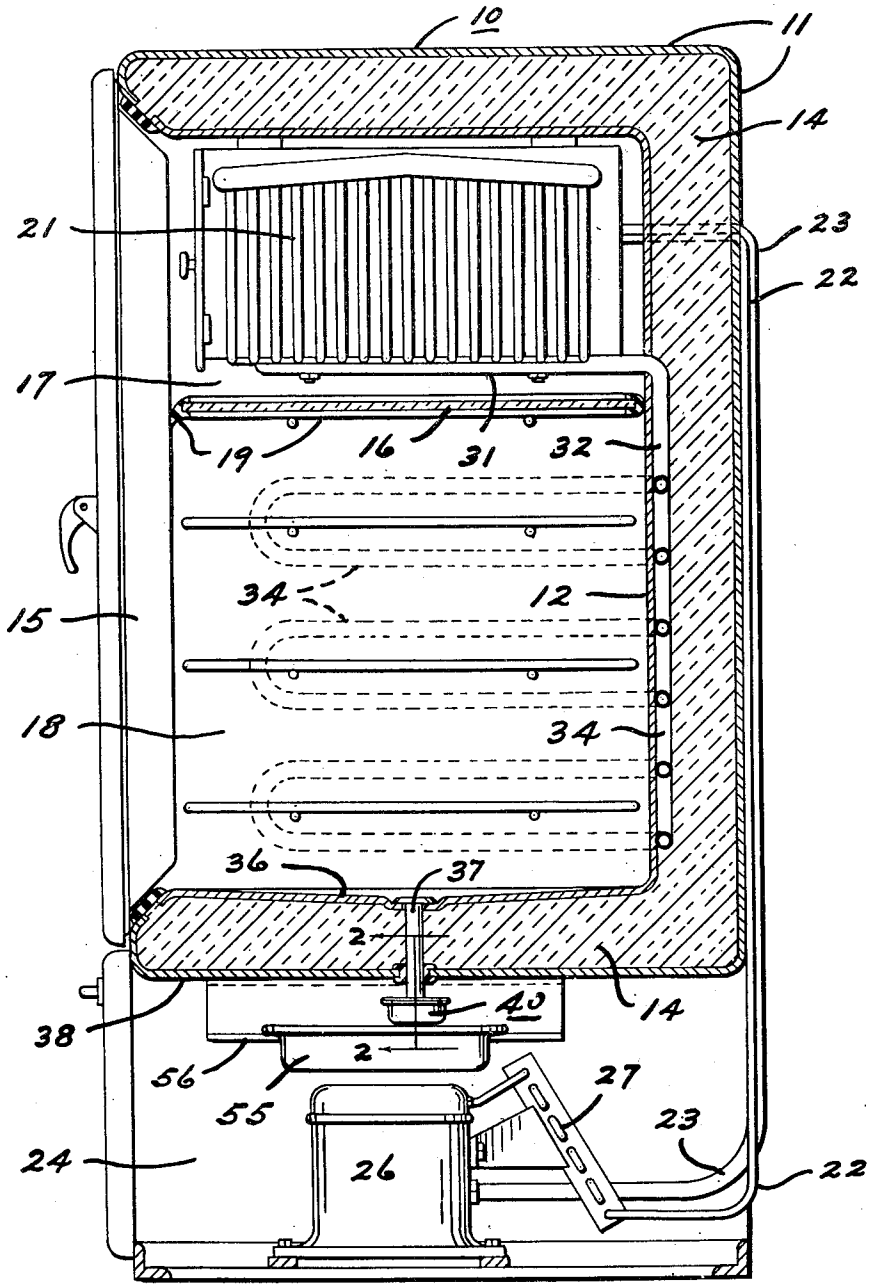


FIG. 1

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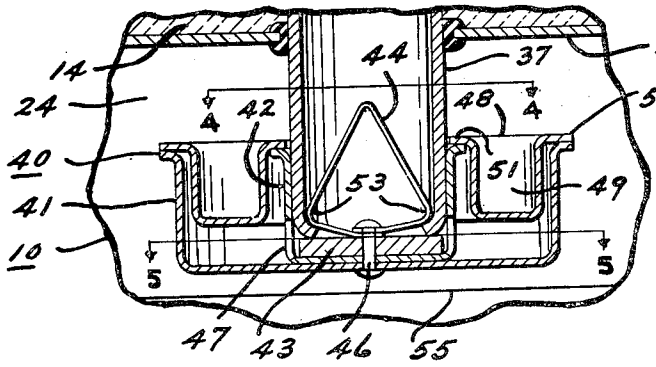


FIG. 2

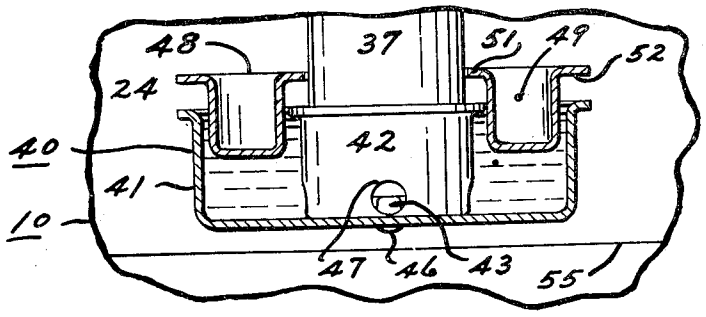


FIG. 3

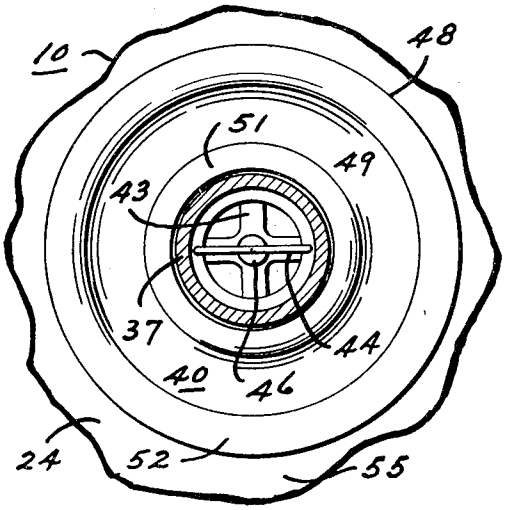


FIG. 4

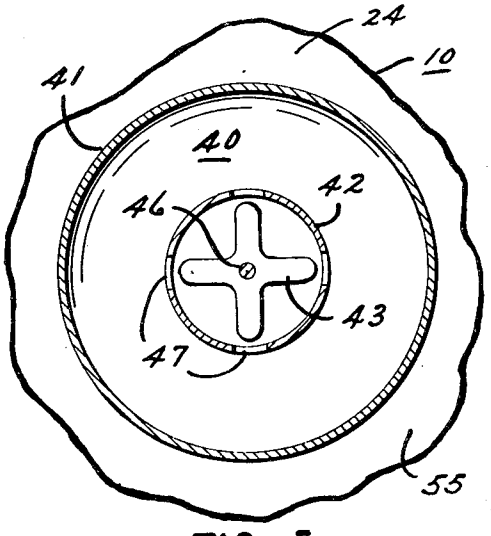


FIG. 5

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2,485,115

REFRIGERATING APPARATUS HAVING CONDENSATE COLLECTING MEANS

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Application July 19, 1946, Serial No. 684,956

6 Claims. (Cl. 62—103)

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This invention relates to refrigerating apparatus and particularly to portable household refrigerators.

Present-day household refrigerators have the chamber therein divided into a plurality of storage compartments such as a low temperature freezing compartment for the storage of frozen foods or for freezing certain food products and a higher temperatured high relative humidity compartment for the storage of fruits, vegetables and other comestibles. In such refrigerators, particularly in localities where the moisture content of the air is high, too much moisture will accumulate on the walls of the higher temperatured high relative humidity compartment creating an over-moist condition therein. In this same refrigerator located in other climatic conditions, particularly where the moisture content of the air is negligible, a proper high relative humidity will be maintained in the higher temperatured compartment without the accumulation of too much moisture therein. However, some means must be provided in all of such refrigerators in order to overcome this problem, regardless of where the refrigerator is to be installed.

While I am aware of the fact that refrigerators have heretofore been provided with a drain pipe for conducting water therefrom and that such pipes usually include a trap which seals, by water contained therein, or flowing therethrough, the pipe against the entrance of insects. A drain pipe trap of this type is effective for sealing the pipe only as long as water is contained therein and it is therefore not practical for use on present-day household refrigerator cabinets of the character above described where at times or in certain localities the drain pipe may be dry or devoid of water.

It is an object of my invention to provide an improved seal for a drain pipe of a refrigerator cabinet.

Another object of my invention is to provide a drain pipe device for a refrigerator cabinet that is effective at all times for sealing the pipe against the entrance of insects and for preventing the circulation of air into or out of a refrigerated compartment of the cabinet.

A further and more specific object of my invention is to provide a drain pipe trap device for a refrigerator cabinet with a mechanical seal which is effective when no water is in or flowing through the pipe and which is rendered ineffective by a predetermined accumulation of water in the device.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the present invention is clearly shown.

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In the drawings:

Fig. 1 is a vertical sectional view of a refrigerator having my invention embodied therein;

Fig. 2 is an enlarged fragmentary sectional view taken on the line 2—2 of Fig. 1 showing my improved drain pipe device with the mechanical seal portion thereof effective for closing same;

Fig. 3 is a view similar to Fig. 2 partly in section and partly in elevation showing the mechanical seal rendered ineffective by water in the device;

Fig. 4 is a horizontal sectional view of the drain pipe device taken on the line 4—4 of Fig. 2; and

Fig. 5 is a horizontal sectional view of the drain pipe device taken on the line 5—5 of Fig. 2.

In order to illustrate my invention I have shown in the drawings a multi-temperatured compartment household refrigerating apparatus somewhat of the type disclosed and more specifically described in the Ralph K. Miller Patent No. 2,228,144 of January 7, 1941. My invention is particularly applicable to apparatus of the type disclosed in the patent referred to and I may only briefly describe the construction of the refrigerating apparatus since a more detailed description may be had by reference to the Miller patent herein identified. Referring now to the drawings, there is shown a portable household refrigerating apparatus comprising a cabinet 10 having sheet metal outer walls or panels 11 and an inner metal liner 12 with insulating material 14 disposed therebetween. The liner 12 forms a chamber within cabinet 10 and an opening therein provides access to the chamber, which opening is normally closed by a door 15. A glass partition means 16 is horizontally disposed within the cabinet chamber and divides this chamber into an upper food storage compartment 17 and a lower food storage compartment 18. The partition 16 may be bounded by a resilient rubber element 19 which engages walls of the chamber and the chamber door 15 to seal off the compartments 17 and 18 from air circulation therebetween. Partition 16 normally isolates the compartments 17 and 18 from one another and provides a certain amount of insulation between these compartments so that different temperatures, as well as different humidities, may be maintained in the two separate compartments.

In order to cool the upper compartment 17 to a low temperature an evaporator 21, of any suitable design or construction, and preferably of the sheet metal variety, is suspended from the top wall of liner 12. Evaporator 21 is connected by conduits 22 and 23 in the usual manner to a refrigerant compressing and liquefying unit mounted in a machine compartment 24 located below the insulated compartment 18. This unit includes a motor-compressor 26 and a condenser

27. Refrigerant supplied to evaporator 21 by the translating unit is evaporated therein and removes heat from the upper compartment 17 in the well known manner to cool this compartment to a predetermined low temperature. The translating unit may be intermittently operated under the control of conventional controls employed for this purpose. A closed secondary refrigerating system or circuit includes a conduit portion 31 secured in intimate thermal contact with the bottom wall of evaporator 21 of the primary refrigerating system and forms a condensing portion for volatile refrigerant sealed within the secondary circuit. A conduit or conduits 32 connected to the condensing portion 31 of the secondary refrigerating system are also connected to refrigerant evaporating conduit loops 34 extending over and secured, in any suitable manner, directly to that portion of liner 12 forming walls of the lower food compartment 18. This secondary refrigerating system operates at a higher temperature than the primary evaporator and the temperature of compartment 18 is maintained in the vicinity of 35° F. At this temperature air within compartment 18 is maintained at a high relative humidity while the air within the freezing compartment 17 is substantially dry due to its giving up its moisture to the walls of evaporator 21 which are maintained below freezing temperature.

In the use of a refrigerating apparatus of the type disclosed no difficulty is encountered in certain climates and the apparatus functions to maintain a predetermined high relative humidity in the food storage compartment 18 which is desirable for the proper preservation of fruits, vegetables and other comestibles. However, in other climates, where the air is laden with moisture and is of high relative humidity, normal leakage of the air into compartment 18 or frequent opening and closing of the door 15 causes moisture to condense out of the air and collect on walls of compartment 18, being cooled by the refrigerant evaporating conduit loops 34 of the secondary refrigerating circuit. The moisture flows from the side walls of compartment 18 and will, unless provision is made to drain water out of this compartment, accumulate in the bottom of the compartment and create a too moist condition therein. This will impair the proper cold storage preservation of foods in compartment 18. My invention is directed to the elimination of this over-moist condition within the high relative humidity food storage compartment and particularly to a drain pipe device for removing water from the compartment 18, which device will at all times prevent the flow of air into or out of compartment 18 and prevent insects from entering the food compartment through the drain pipe.

Referring again to the drawings it will be noted that the bottom wall 36 of liner 12 is slightly inclined from a point near the center of the cabinet upwardly to where it merges into the upright side walls and that a drain pipe 37 extends from this bottom wall 36 down through the insulating material 14 and through the bottom wall 38 of cabinet 10 (see Fig. 1). The lower end of pipe 37 is swedged inwardly for receiving and holding a drain pipe trap device generally represented by the reference character 40. Device 40 comprises a large cup-like member 41 and a small cup-like member 42 secured thereto, as will presently be described (see Fig. 2). The upper outwardly flared edges of cups 41 and 42 are in horizontal alignment with one another and form seats

for a mechanical seal to be hereinafter more fully described. A spacing spider 43 and a wire clip 44 are disposed within the small cup 42 and a rivet 46 passing through these elements and the bottom wall of cup 41 lock the elements to one another in assembled relation. The small cup 42 has a plurality of holes 47 provided therein adjacent its bottom wall to permit water to pass from the pipe 37 through cup 42 and into cup 41 or into the chamber provided between the side walls of the cup members. A mechanical means or float 48 constructed of aluminum or any other light weight material rests on the top edges of cup-like members 41 and 42 to normally seal the device 40. Float 48 includes a ring-like depressed portion 49 which extends into the chamber between the cups and flanges 51 and 52 formed thereon, and engages the tops of the cups 42 and 41 respectively. Float 48 is provided with a central opening which surrounds the pipe 37 whereby this pipe forms a guide for up and down movement of the float. In order to assemble the device 40 upon the pipe 37 the secured together elements 41, 42, 43, 44 and 46, with the float 48 resting thereon, is moved toward the lower end of pipe 37 so that the spring clip 44 will enter the pipe. Shoulders or bends 53 provided on the resilient spring clip 44 will be slightly deflected upon passing over the swedged-in end part of pipe 37 as the device is moved into place. The device 40 is moved upwardly relative to pipe 37 until the end of the pipe strikes the spacing spider 43 then the shoulders 53 on clip 44 will spring outwardly and bear against the inner wall of pipe 37 above the swedged-in end part thereof to lock the device 40 on the pipe. It will be noted that a relatively large pan 55 is mounted directly below the device 40 and is supported on suitable tracks 56 (see Fig. 1). Pan 55 is adapted to catch water flowing from the trap device 40 and the heat in the machine compartment 24, generated by the refrigerant compressing and condensing unit located therein, will cause evaporation of water from pan 55 to the atmosphere.

The construction and method of locking the trap device or insect excluding means 40 upon the drain pipe 37, as described inherently renders the device detachable from the pipe and removable from the refrigerator cabinet at will for cleaning purposes. For example, should fruit juices, syrups, milk or cream be spilled in the food compartment 18 and flow down the drain pipe 37 and into the device 40, a downward force applied to the device 40 will cause the shoulders 53 on spring clip 44 to be sprung or moved inwardly whereby these shoulders will ride over the swedged-in end part of the pipe and permit removal of device 40 from the pipe. The device 40 may then be cleaned and a brush or other cleaning element may be inserted into the lower end of the drain pipe to thereby clean out the same. Thereafter the insect excluding means or trap device 40 can be detachably remounted upon the end of drain pipe 37 in the manner heretofore set forth.

When conditions are normal within the food storage compartment 18 no water will flow into pipe 37 and therefore the trap device 40 is substantially dry or devoid of water. The flanges 51 and 52 of float 48 rest on the outwardly flared flanges at the top of cups 41 and 42 to provide a mechanical seal for the drain device 40. As long as float 48 rests on the cups 41 and 42 (see Fig. 2) device 40 is sealed against the entrance of insects into the drain pipe 37 and compartment 18, and

compartment 18 is closed against the ingress of air exteriorly thereof. However, when conditions become abnormal within compartment 18 and too much moisture tends to condense therein the moisture will flow into drain pipe 37 and be conveyed to the device 40. The water flows from pipe 37 around the legs of spider 43 and through the holes 47 in small cup 42 into large cup 41. This water accumulates in device 40 to a level above the lower end of pipe 37 to seal the pipe against entrance of insects. As the level of water in device 40 rises the depressed portion 49 of float 48 will float, partly submerged, in the body of water. The buoyancy of float 48 will cause its flanges 51 and 52 to be elevated above the flanges on cups 41 and 42 and the water will overflow the device 40 (see Fig. 3). Water overflowing device 40 will be received in the pan 55 and this water being exposed to the heat within the machine compartment 24 will be evaporated into the atmosphere. Pan 55 is removably mounted and may, if desired, be manually removed from compartment 24 and water emptied therefrom.

From the foregoing it will be seen that I have provided an improved drain pipe device for refrigerator cabinets wherein the pipe is sealed against the entrance of insects at all times regardless of whether or not water is trapped in the device. My improved pipe trap device renders the use of refrigerator cabinets provided with separate food storage compartments, maintained at different temperatures and relative humidities with respect to one another, satisfactory in various localities irrespective of different climatic conditions. My improved drain pipe device eliminates the necessity of giving a refrigerating apparatus of the type disclosed any special care or attention during periods of excessively high humidity conditions, while at the same time insuring that the drain pipe is effectively sealed. The improved drain pipe device also prevents the circulation of air into or out of the compartment being refrigerated and no loss in efficiency occurs by virtue of connecting a drain pipe in communication with the compartment.

While the form of embodiment of the invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, as may come within the scope of the claims which follow.

What is claimed is as follows:

1. The combination of a refrigerating apparatus including a cabinet, a food storage compartment within said cabinet, means for cooling said compartment and at times causing moisture to condense out of the air therein, a drain pipe extending through a wall of said compartment for conveying the condensate water to the exterior thereof, and insect excluding means associated with the lower end of said drain pipe receiving condensate water therefrom and sealing said end of said drain pipe when water is present therein and also sealing said end of said drain pipe when devoid of water to at all times block the passage of insects into said food compartment, said insect excluding means comprising an open-top condensate collecting receptacle, said lower end of said drain pipe projecting a substantial distance into said receptacle through the open top thereof and adapted to form with water contained therein a seal for said pipe, a closure member normally sealing the open top of said receptacle, the closure member being movable upwardly relative to said receptacle in response to a predetermined accumulation of water therein to permit the water to overflow same, said closure member surrounding said pipe and having its movement guided thereby.

2. The combination defined in claim 1 wherein the insect excluding means is detachably secured to the drain pipe to permit insertion of a cleaning device into the lower end thereof.

3. The combination comprising, a food storage compartment, an evaporator of a closed refrigerating system cooling said compartment and at times condensing moisture out of the air therein, a conduit extending from said compartment for conveying condensate water therefrom, means at one end of said conduit effective either alone or in cooperation with water flowing into association therewith for at all times preventing the passage of insects through said conduit into said compartment, said means including a buoyant element movable in response to condensate water flowing into association therewith for permitting the water to escape therefrom and said buoyant element surrounding a portion of said conduit and having its movement guided thereby.

4. The combination comprising, a food storage compartment, an evaporator of a closed refrigerating system cooling said compartment and at times condensing moisture out of the air therein, a drain pipe extending through a wall of said compartment for conveying condensate water therefrom, means at the lower end of said conduit effective either alone or in cooperation with water flowing into association therewith for at all times preventing the passage of insects through said pipe into said compartment, said means including an open-top float movable in response to condensate water flowing into association therewith for permitting the water to escape therefrom, and said float surrounding a portion of said pipe and having its movement guided thereby.

5. The combination comprising, a food storage compartment, an evaporator of a closed refrigerating system cooling said compartment and at times condensing moisture out of the air therein, a drain pipe extending through a wall of said compartment for conveying condensate water therefrom, a cup secured to the lower end of said drain pipe, a float within said cup effective either along or in cooperation with water flowing into said cup for at all times preventing the passage of insects through said pipe into said compartment, said float being movable in response to condensate water accumulating in said cup for permitting the water to escape therefrom, and said float surrounding a portion of said pipe and having its movement guided thereby.

6. The combination defined in claim 5 wherein the cup is detachably secured to the drain pipe to permit insertion of a cleaning device into the lower end thereof.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,149,675	Nix	Aug. 10, 1915
1,941,814	O'Connor	Jan. 2, 1934
2,228,144	Miller	Jan. 7, 1941
2,303,138	Philipp	Nov. 24, 1942