Nov. 8, 1955 W. L. MORRISON 2,722,809

REFRIGERATOR

Filed Jan. 27, 1950 2 Sheets-Sheet 1

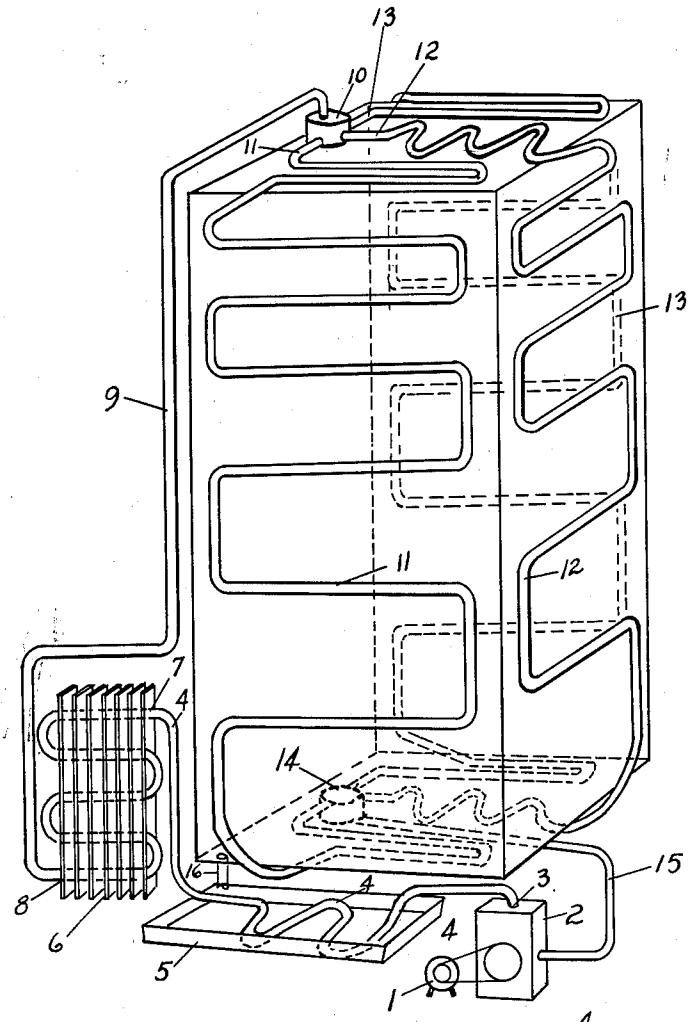


Fig. 1

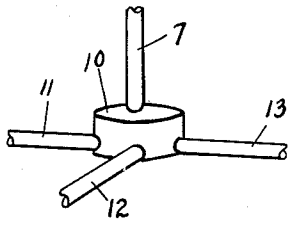


Fig. 2

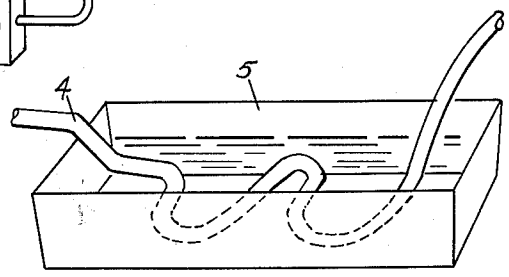


Fig. 3

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REFRIGERATOR

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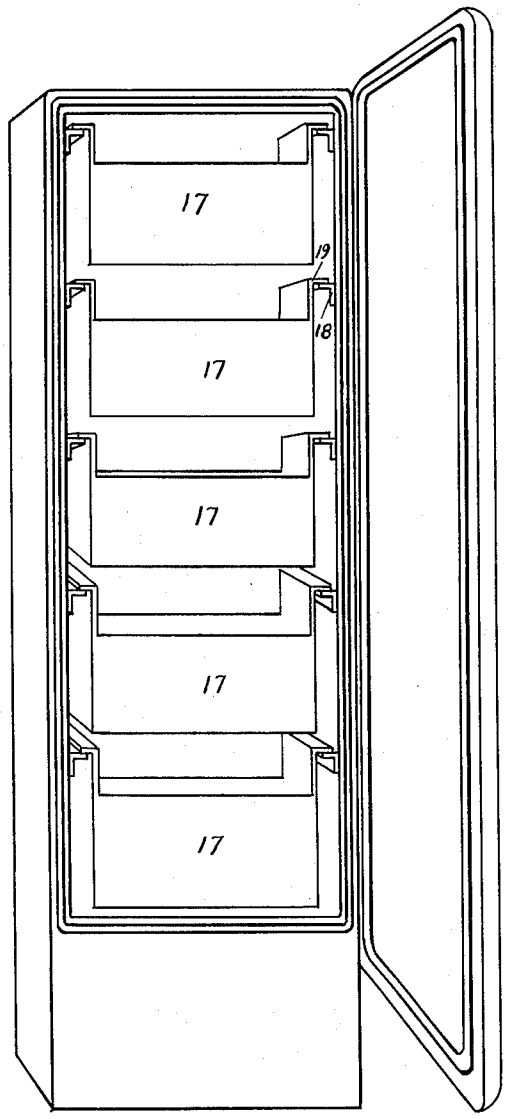


Fig. 4

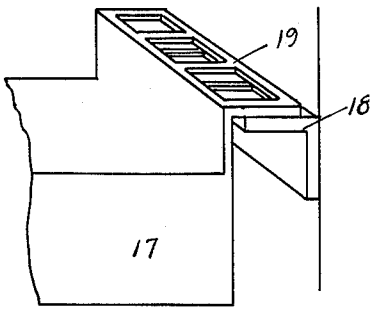


Fig. 5

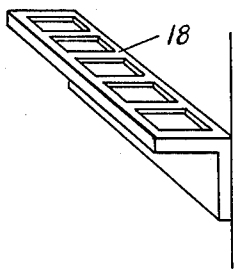


Fig. 6

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REFRIGERATOR

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Application January 27, 1950, Serial No. 140,909

2 Claims. (Cl. 62—116)

My invention relates to an improvement in refrigerator and has for one purpose to provide a refrigerator that will prolong the life of fruits and vegetables.

Another purpose is to provide a refrigerator with a high humidity and high vapor pressure.

Another purpose is to reduce the temperature differential between the cold element and the food stored in a refrigerator to the minimum.

Another purpose is to utilize the excess moisture caused by opening and closing the door and the escape of cold dry air from the box replaced by warm moist air from the room, to remove the super heat from the discharge of the compressor, and to maintain a high moisture level in the refrigerator.

Another purpose is to provide a means of expanding the refrigerant in a manifold on the top side of the cold element and sending it through three parallel tubes of equal length down three sides of the refrigerator to give an equalized refrigeration throughout the interior.

Another purpose is to provide a refrigerator with the coldest refrigerant at the top to compensate for the effect of gravity on the warm air within the refrigerator.

Another purpose is to provide a means of keeping the fruit and vegetables in baskets that slide on a track and which allow the air to circulate through.

Other purposes will appear from time to time in the course of the specification and claims.

I illustrate my invention more or less diagrammatically in the following figures in which:

Figure 1 is a perspective diagrammatic view of the refrigeration system;

Figure 2 is an enlarged view of the upper manifold;

Figure 3 is an enlarged view of the drip pan with the discharge tubes from the compressor extending through it;

Figure 4 is a front perspective view of the refrigerator with the door open;

Figure 5 is an enlarged view of the track and shelf support; and

Figure 6 is an enlarged view of the track on the refrigerator wall.

Like parts will be indicated by like characters throughout the specification and drawings.

Referring to Figure 1, motor **1** drives compressor **2**, the compressed super-heated refrigerant is discharged at an exit **3** to tube **4**, extending through refrigerator condensate drip pan **5**. The tube **4** extends through condenser fins **6**, entering the fin condenser area at **7** near the top and leaving at **8** near the bottom. The condensed refrigerant passes through tube **9** to manifold **10** at the top of the refrigerator. From the manifold **10** the refrigerant is expanded into three sets of equal length tubes **11**, **12**, and **13**. The three tubes together cool the top side of the cold element and then each extends down a side wall of the refrigerator to cool it. The tubes **11**, **12**, and **13** then extend along the bottom of the box to join a manifold **14** connected by pipe **15** to the low side of compressor **2**. The ducts **11**, **12**, and **13** are arranged so

that most of the tubing is located near the top of the box and the concentration of the refrigerating effect decreases downwardly from the top in order to compensate for the rise of warm air within. This arrangement of tubing assures equalized refrigeration throughout the interior.

The moisture that condenses within the box drops to the bottom and drains off through a tube **16** which empties into drip pan **5**. This water aids in removing the super heat from the refrigerant in tube **4** as it leaves its compressor **2**, and this heat exchange causes the evaporation of the water. Thus I eliminate the necessity of emptying the drip pan frequently.

Figure 2 is an enlarged portion of the expansion manifold **10** at the top of the refrigerator showing how the refrigerant is divided equally into three lines of tubing **11**, **12**, and **13**.

Figure 3 is an enlarged view of the drip pan **5** with the discharge tubing **4** extending through it.

Figures 4, 5, and 6 illustrate an improved manner of storing the food. By sliding the metal baskets **17** on a perforated track **18** the food is easily accessible and because of the perforations in the track **18** and the flanges of the baskets **19**, the circulation of air in the refrigerator is not impeded.

The use and operation of my invention are as follows:

In the storing and preservation of food, the aging force that must be overcome is dehydration. Dehydration is caused by a great difference in temperature between the cold element and the ultimate temperature of the food stored. This differential can be reduced by maintaining the cold surface at or about 32° F. and by so disposing the refrigeration coils so that they practically completely surround the space to be refrigerated. Thus they will very quickly bring the enclosed space to almost the same temperature as the refrigeration coils. By arranging the tubing so that more of it is near the top of the refrigerator, I overcome the effect of gravity which drives the warmer air to the top within the refrigerator. This effects an equalization of temperature within the refrigerator which further counteracts dehydration. When any one spot in a refrigerator is colder than another, it draws the warmer air to it and if that warmer air comes from the fruits or vegetables it carries the moisture of the fruits or vegetables with it.

To further increase the effectiveness of my invention, I maintain high humidity in the refrigerator. This is achieved because the moist warm air that enters the refrigerator with the food or when the doors are opened is rapidly condensed by the great expanse of cold element. Some of the moisture remains on the food which is a healthy condition because as long as there is moisture on the food little, if any moisture is being drawn out of the food. The rest of the moisture drains into the drip pan where it is evaporated by the compressor discharge coils outside of the box.

By maintaining a temperature which is below the freezing point of water, but above the freezing point of fruit or vegetables, I am able to keep fruit and vegetables in a dormant stage because I have found that at that temperature the further maturing of fruit and vegetables is suspended. Experience shows that even such fruits as pears can be kept for long periods of time in this dormant stage and can be ripened in a day or two when removed from the refrigerator.

In effect, the arrangement whereby the top, the bottom and three sides of the box are all kept cool by the evaporating coils results in a very widely extended cooling area almost entirely surrounding the storage chamber. Under these circumstances, the temperature of any particular part of the cooling area can be little, if any, below the desired temperature of the food stored in the

chamber. Thus, the vapor pressure tending to cause movement of moisture from the food to the cold surfaces is kept at a minimum. Moreover, since the temperature of the cold surfaces is high, there is little, if any, frosting or freezing of water on the cold surfaces. The moisture in the air is condensed and runs off the surfaces down into the pan below and outside of the storage chamber, which moisture is again evaporated by the warm pipes leading from the compressor to the condenser coils so that there is no accumulation of water in this drip tray.

The arrangement whereby the coils of the evaporating tubes become more widely spaced from the top toward the bottom of the box is important. The reason for this is that cold air tends to fall and if the temperature or the heat absorbing effect was the same from top to bottom of the cold box walls, we would have a situation where the bottom was colder than the top. What we want is a situation where the temperature is as nearly possible uniform from top to bottom.

When the door is opened, all the cold air with some of its moisture extracted, the cold surfaces being much colder than the air in the room, falls out of the box and is replaced by warm air from the room having, of course, much higher vapor content. Then, when the box is closed, this air is cooled, and tends to give up its moisture by precipitation. In a sense, it actually rains in the box. Water is deposited on the walls and on the contents of the box and thus the food is kept in a moist, cold condition. Every time the door is opened and closed, this happens, so that every time the door is opened and closed, more moisture is brought into the chamber. This moisture gradually may evaporate. It gradually may travel from the food to the walls of the box, but to do this it must first, after it has been deposited on the food, be vaporized, then travel to the walls of the box, then be condensed and then discharged.

The slow, delayed process which, under normal circumstances is enough, is completed before the box door is opened again to admit more warm moisture-laden air to again be deposited by condensation on the cold contents of the box.

I claim:

1. In a refrigerator, a vertically elongated food storage chamber having top, bottom and side walls, a vertically disposed opening into said chamber extending substantially from top to bottom thereof, a removable closure for said opening, a compressor, a condenser and an evaporator, conduits joining them, a manifold associated with the top and the bottom walls of the chamber, a single suction connection from the manifold associated with the bottom wall leading to the compressor, a single discharge connection leading from the condenser with the manifold associated with the top of the chamber, the evaporator comprising a plurality of tubes in parallel, extending between the two manifolds.

2. In a refrigerator, a vertically elongated food storage chamber having top, bottom and side walls, a vertically disposed opening into said chamber extending substantially from top to bottom thereof, a removable closure for said opening, a compressor, a condenser and an evaporator, conduits joining them, a manifold associated with the top and the bottom walls of the chamber, a single suction connection from the manifold associated with the bottom wall leading to the compressor, a single discharge connection leading from the condenser with the manifold associated with the top of the chamber, the evaporator comprising a plurality of tubes in parallel, extending between the two manifolds, all of said tubes closely spaced associated with the top of the chamber and all of said tubes more widely spaced extending downwardly along the wall of the chamber, the tubes being coiled, the spacing between the coils increasing from the top of each wall downwardly toward the bottom of the chamber.

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