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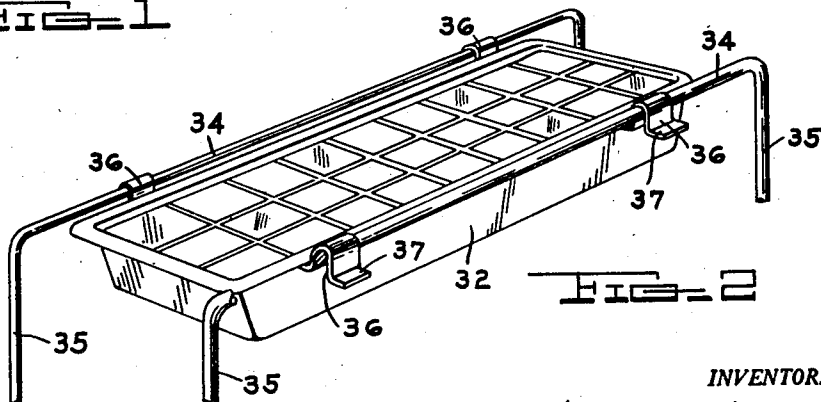
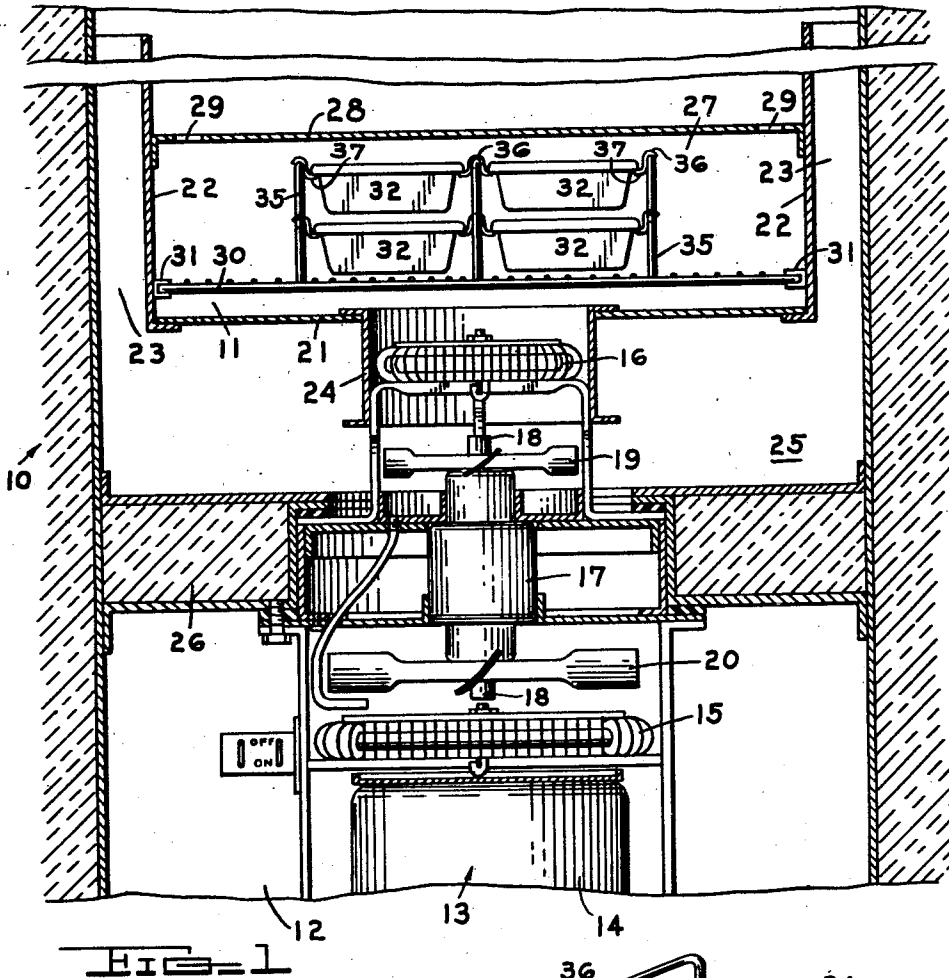
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2,561,277

ICE TRAY SUPPORTING ASSEMBLY FOR REFRIGERATORS

Filed Aug. 2, 1948

2 Sheets-Sheet 1



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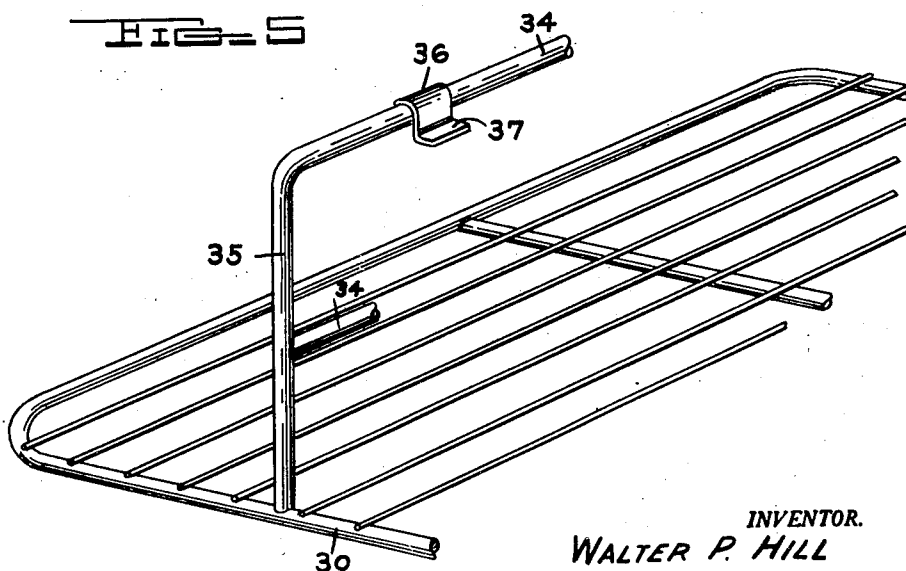
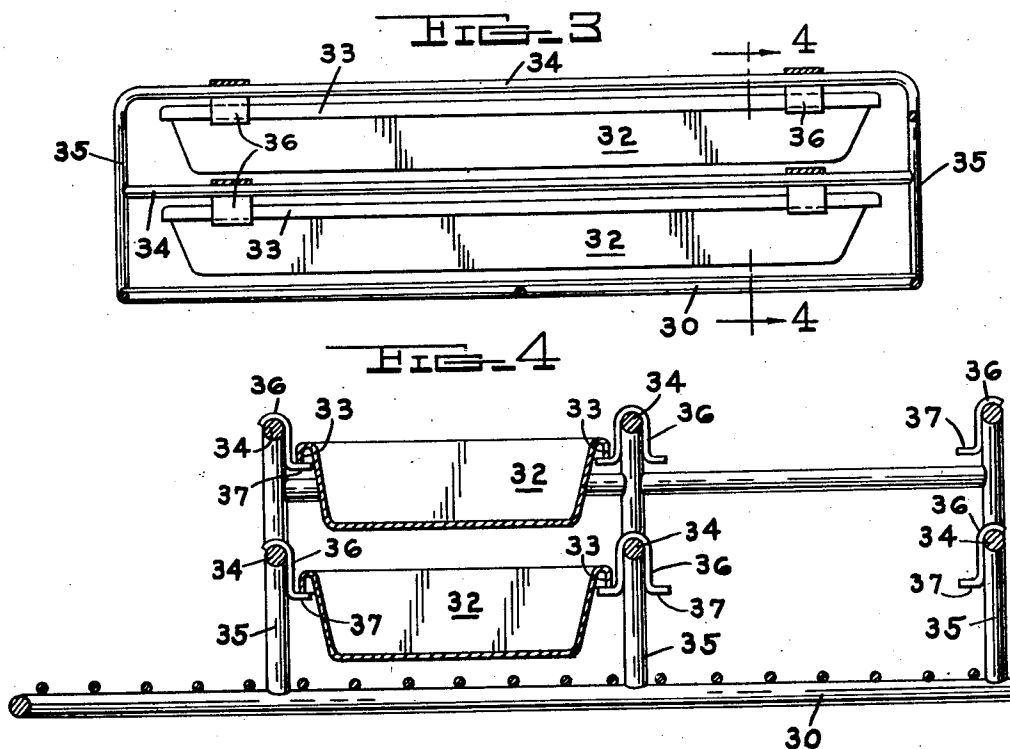
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ICE TRAY SUPPORTING ASSEMBLY FOR REFRIGERATORS

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2 Sheets-Sheet 2



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ICE TRAY SUPPORTING ASSEMBLY FOR REFRIGERATORS

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8 Claims. (Cl. 62—117.3)

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This invention relates to refrigerators and refers more particularly to improvements in refrigerators equipped with ice forming means.

In most refrigerators having provision for forming ice, a plurality of trays are supported directly on one or more plates forming a part of or cooled by the evaporator of the refrigerating system. The plates are cooled by the evaporator to a temperature below the freezing point of water and absorb sufficient heat from the water contained in the trays to convert the water into ice.

In refrigerators of the above general type where the bottom surfaces of the trays are in direct contact with the top surfaces of the freezing plates, moisture usually accumulates between these surfaces and is frozen. As a result the trays are frozen to the plates and considerable difficulty is encountered in removing the trays from the plates. Moreover when the refrigerating system is operated to produce temperatures within the food compartment considered practical, a substantial period of time is required to freeze the water in the trays and, as a consequence, the ice forming phase of the system is lacking in efficiency.

With the above in view, it is one of the objects of this invention to improve the efficiency of the ice forming phase, and at the same time, reduce the area of metal to metal contact of the trays with their support to a negligible amount, so that the trays may be readily removed with little or no particular effort.

A more detailed object of this invention is to discharge refrigerated air into the food storage compartment and to support the ice forming trays within this compartment in a manner such that the refrigerated air circulates around the trays in heat absorbing relationship to the walls of the trays. In accordance with this invention practically the entire area of the side, end and bottom walls of the trays is exposed to the refrigerated air entering the compartment, and as a consequence, the water within the trays is rapidly converted into ice.

The foregoing as well as other objects will be made more apparent as this description proceeds, especially when considered in connection with the accompanying drawings, wherein:

Figure 1 is a fragmentary sectional view of a domestic type refrigerator embodying the features of this invention;

Figure 2 is a perspective view partly in section showing a part of the ice forming means;

Figure 3 is a side elevational view partly in section of the ice forming means;

Figure 4 is a sectional view taken substantially on the line 4—4 of Figure 3; and

Figure 5 is a perspective view of another part of the ice forming means.

Referring more in detail to the drawings, it will be noted that the numeral 10 in Figure 1 of the drawings designates a refrigerator cabinet having a food storage compartment 11 and having a compartment 12 positioned below the compartment 11 for accommodating certain parts of the refrigerating apparatus 13. The refrigerating apparatus forms a unit capable of being installed and removed from the cabinet 10 as an assembly. This refrigerating apparatus and the peculiar construction of the cabinet form no part of this invention. The refrigerating apparatus 13 selected herein for the purpose of illustration forms the subject matter of my copending application Serial No. 42,047, filed August 2, 1948; and the cabinet construction forms the subject matter of my copending application Serial No. 42,045, filed August 2, 1948.

In connection with the refrigerating apparatus, it will suffice for the purpose of this description to point out that it comprises a sealed motor-compressor unit 14, a condenser 15 and an evaporator 16. Suitably supported between the evaporator 16 and condenser 15 is an electric motor 17 having a drive shaft 18 extending vertically beyond opposite ends thereof. A fan 19 is secured to the upper end of the drive shaft in a position to force air through the evaporator and a fan 20 is secured to the lower end of the shaft for forcing air through the condenser to cool the latter.

Insofar as the present invention is concerned, the evaporator and condenser may be of any suitable design. However, in the interests of compactness and maximum operating efficiency, both units preferably comprise a substantially flat coil of tubing having a helical fin of considerable height thereon. Such a construction is preferred, because it enables obtaining a substantial area of heat transfer surface with a small, compact unit, and is especially efficient when air is forced over the radiating surface by a fan or blower.

The food storage compartment 11 has a bottom wall 21 and has opposite side walls 22 which cooperate with the adjacent walls of the cabinet 10 to form air passages 23. The bottom wall 21 is formed with a central opening for receiving the upper end of a tubular housing 24 having the lower end communicating with the lower ends of the passages 23 through a space 25 formed in the cabinet 10 below the bottom wall 21 of the compartment 11.

As shown in Figure 1 of the drawings, the

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refrigerating assembly 13 is fixed to a centrally apertured partition 26 separating the compartments 11 and 12. The motor-compressor unit 14, condenser 15 and fan 20 are located in the compartment 12, while the motor 17 assumes a position within the central aperture in the partition. The evaporator 16 and fan 19 are located within the cabinet above the partition 26. In detail the evaporator 16 assumes a position within the tubular housing 24, and the fan 19 occupies a position directly below the lower end of the housing 24. The above construction is such that the fan 20 forces air downwardly through the condenser in heat absorbing relation to the helical fin on the condenser coil and assures effectively cooling the condenser. The fan 19 on the other hand, draws relatively warm air from the top of the food storage compartment downwardly through the passages 23 and forces this air upwardly through the housing 16 into the lower end of the food storage compartment. As the air passes upwardly through the housing 24, it is compelled to flow over the evaporator in direct contact with the helical fin on the evaporator coils and the temperature of this air is substantially reduced. The temperature of the air is reduced by the evaporator to 10° to 15° F., or in any case, below the freezing point of water.

The refrigerated air discharged into the compartment 11 from the upper end of the housing 24 is first introduced into an ice forming area 27 separated from the main food storage space in the compartment 11 by a wall or partition 28. The wall 28 is secured within the compartment 11 in vertical spaced relation to the bottom wall 21, and is formed with a series of openings 29 through which air from the area 27 escapes into the main food storage space. This refrigerated air passes upwardly in the compartment 11 to lower the temperature within the latter and eventually flows downwardly through the passages 23 to the intake side of the fan 19.

Supported within the area 27 in vertical spaced relation to the bottom wall 21 of the compartment 11 is a grille 30 preferably formed of wire and designed to permit relatively free flow of air upwardly therethrough. The opposite sides of the grille slidably engage suitable guides 31 which are secured to adjacent side walls of the compartment 11. Thus the grille may be quickly removed from the cabinet through the usual access opening formed in the front wall of the cabinet.

Removably supported on the grille in the direct path of the refrigerated air passing upwardly through the grille from the upper end of the housing 24 are a plurality of tiers of ice forming trays 32. The trays in each tier are spaced vertically one above the other and the lowermost tray in each tier is spaced above the grille. The arrangement is such that the refrigerated air admitted to the area 27 circulates freely around each tray in heat absorbing relationship to the entire area of the bottom and side walls of the trays. Thus the temperature of water contained in the trays is quickly lowered and converted to ice. In actual practice it has been found that the temperature of the water is not only rapidly lowered, but that the ice formed is crystal clear.

Upon reference to Figure 4 of the drawings, it will be noted that the trays are formed of sheet metal and are of orthodox construction in that they are provided with outwardly tapering side and end walls having the usual reinforcing flange

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33 curled downwardly from the top edges of these walls. The trays are supported on the grille in spaced relation to one another and in spaced relation to the grille by rails 34 extending lengthwise of the trays at opposite sides of the latter and having opposite ends secured to the front and rear edges respectively of the grille 30 by vertical members 35. Mounted on the rails in spaced relationship lengthwise of the rails are clips 36 having laterally extending ears 37 forming seats for engaging the bottom edges of the flanges 33 on the trays. In instances where the rails 34 extend between adjacent tiers of trays, the clips may be inverted U-shaped in cross section, and the ears 37 may be formed on the extremities of the sides of the U-shaped clips, as shown in Figure 4 of the drawings. In any case the area of the flanges 33 on the trays engageable with the respective ears is very small, and as a result, the trays may be readily removed even though the contacting surfaces should freeze together. It will further be understood from the foregoing that the trays 32 may be easily independently removed from the grille 30 or may be removed as a unit with the grille. This latter feature is highly advantageous in that it simplifies and enables thoroughly cleaning the area 27 of the refrigerator.

What I claim as my invention is:

1. In a refrigerator, a cabinet comprising a cold storage compartment having a bottom wall provided with an opening, a partition in the cold storage compartment spaced above the bottom wall and cooperating with the latter to form a freezing chest, means for forcibly moving air upwardly through the opening in said bottom wall into the freezing chest and through an opening in said partition into the storage compartment, and refrigerating apparatus including a cooling element supported in the path of air flow and positioned to cool the air entering the freezing chest.

2. The refrigerator set forth in claim 1 having an apertured support in the freezing chest for freezing trays characterized in that the support has means for holding the trays in spaced relation to each other and to the support whereby refrigerated air passes freely over the bottom, side and end surfaces of the trays.

3. In a refrigerator, a cabinet comprising a cold storage compartment having a bottom wall and having an opening through the bottom wall, means providing a passage communicating at one end with the opening and communicating at the opposite end with the upper regions of the cold storage compartment, a partition in the compartment cooperating with the bottom wall of the compartment to provide a freezing chest and having an opening for the passage of air from the freezing chest into the compartment, means supported in said passage for withdrawing air from the upper regions of the compartment and for discharging the air into the freezing chest through the opening in said bottom wall, refrigerating apparatus having a cooling element supported adjacent the opening in the bottom wall of the compartment and positioned in the path of flow of air through the latter opening to cool the air, and means in the freezing chest for supporting trays in the path of the refrigerated air flowing through the freezing chest.

4. The refrigerator set forth in claim 1 in which the apertured support is in the form of a grille having the opposite sides removably mounted on the adjacent walls of the compartment, and

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in which the trays are removably supported on said grille in spaced relation thereto.

5. The refrigerator set forth in claim 1 in which an apertured support for freezing trays is supported in the freezing chest directly above the opening in the bottom wall of the compartment, and in which means is provided for supporting the cooling element at the intake side of the opening in the bottom wall of the compartment.

6. In a refrigerator, a cabinet having a cold storage compartment and having an opening in the bottom wall of the compartment, means providing a passage communicating at one end with the opening and having the other end open for the entrance of air, means for forcibly moving air through the passage into the compartment, means for cooling the air flowing through the passage including an evaporator supported in the passage, ice forming means including a tray located within the lower portion of said compartment in the direct path of the refrigerated air flowing upwardly into the compartment from said passage, and supporting means for the tray enabling free circulation of the refrigerated air over the bottom and side surfaces of the tray.

7. In a refrigerator, a cabinet having a cold storage compartment and having an opening in the bottom wall of the compartment, an apertured partition cooperating with the lower portion of the compartment to provide an ice chest, means providing a vertical passage for air communicating at the upper end with said opening and having the lower end open, means supported

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adjacent the open end of the passage for forcibly moving air upwardly through the passage and into said ice chest, means for cooling the air flowing upwardly through the passage including an evaporator located within the passage in a position to require the air flowing upwardly in the passage to pass over the same, an ice forming tray located in the chest in the path of the refrigerated air flowing upwardly through the chest, and supporting means for the tray enabling free circulation of the refrigerated air over the bottom, side and end surfaces of the tray.

8. The refrigerator set forth in claim 7 wherein the supporting means comprises a grille having the opposite side walls removably mounted on the side walls of the ice chest adjacent the bottom wall of the compartment and having provision for supporting the tray above the grille in spaced relation to the latter.

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