Dec. 13, 1949 R. CHAPMAN 2,490,995

FREEZER SHELF-COIL ARRANGEMENT

Filed May 5, 1947 2 Sheets-Sheet 1

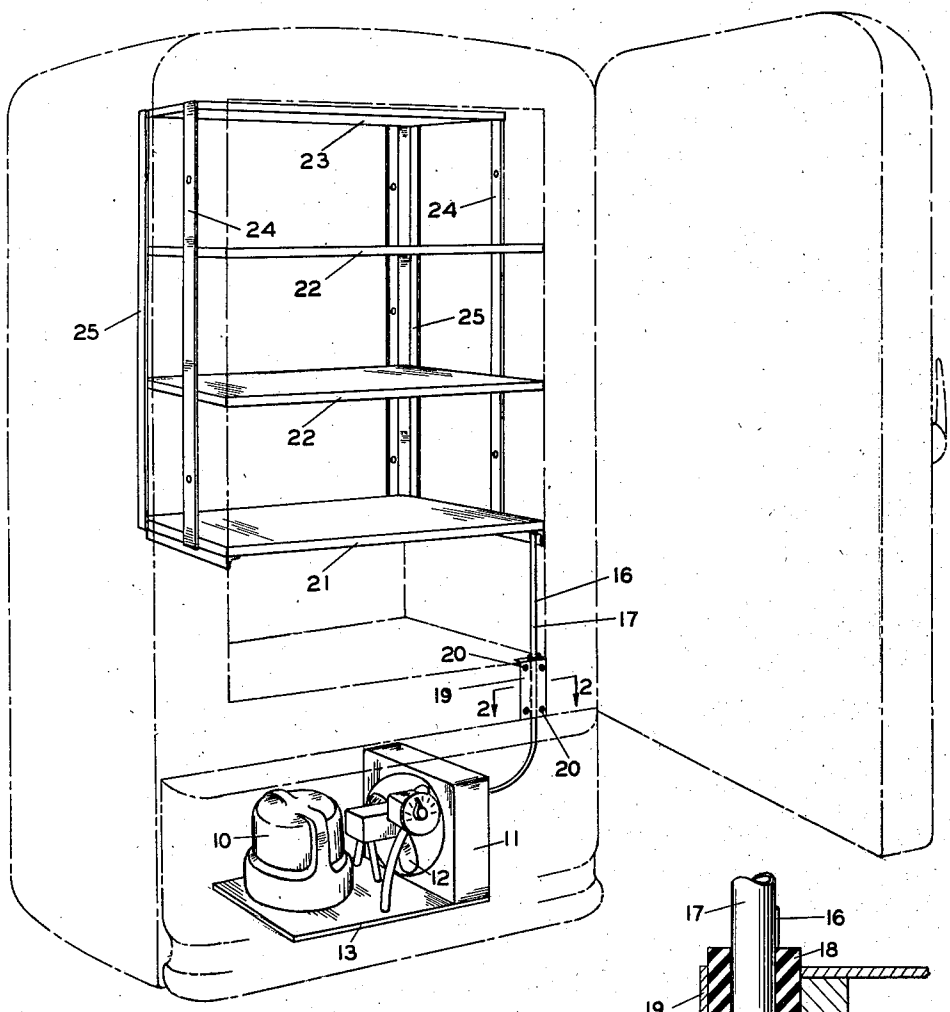


Fig. 1

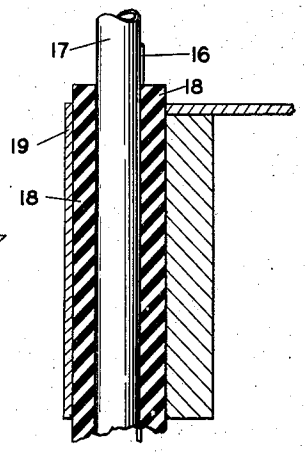


Fig. 3

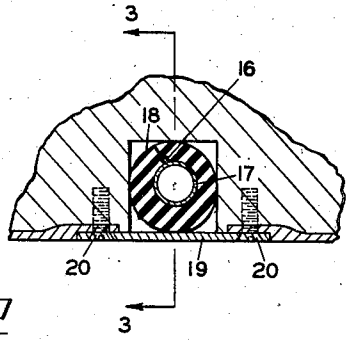


Fig. 2

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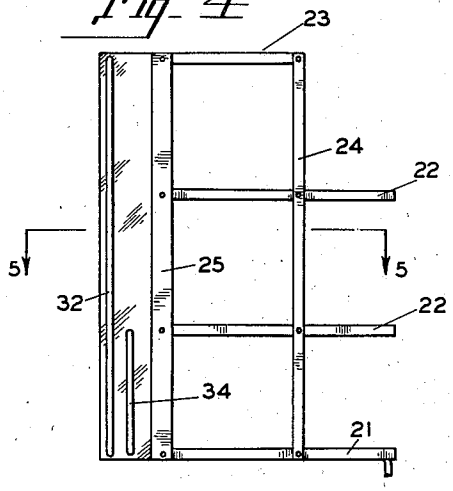
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Fig. 4



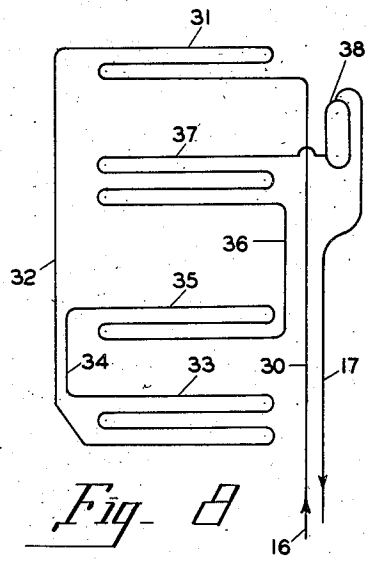


Fig. 8

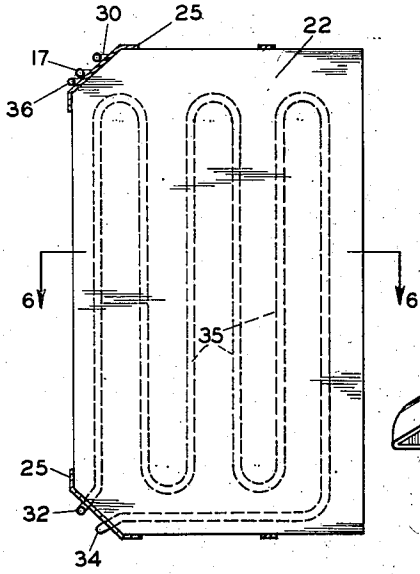


Fig. 5

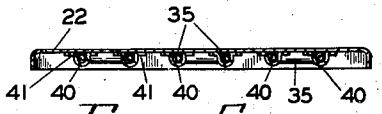


Fig. 6

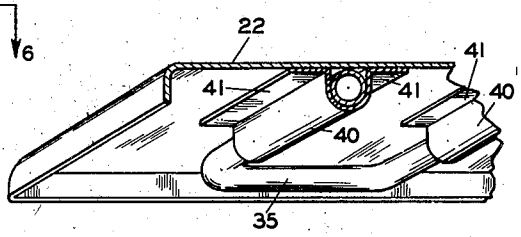


Fig. 7

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FREEZER SHELF-COIL ARRANGEMENT

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3 Claims. (Cl. 62—126)

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My present invention relates to refrigerating mechanism, having particularly to do with the arrangement of shelves upon which food may be placed in a household refrigerator, cold storage box, or the like.

A principal object of the present invention is to provide shelves having expansion tube coils affixed thereto so that the entire food supporting arrangement of a household refrigerator or the like may be maintained at approximately the same temperature.

A further object of the present invention is to provide a freezer unit including supporting shelves intimately adjoined to the expansion tubes.

A further object of the present invention is to provide a refrigerating system assembly including a compressor, condenser and expander which may be fabricated as an entirety and associated with the household refrigerator or storage box adapted to be cooled thereby.

An advantage of the present invention is that a complete system may be fabricated, evacuated and dehydrated, charged with refrigerant and lubricant, and placed in its position of use, so that improper or unskilled field operations are avoided. Another advantage of the foregoing is that an entire refrigerating system assembly may be substituted for one which is in need of repair, thus facilitating repair and overhaul of damaged or worn out units.

The objects and advantages of the present invention will be more readily apparent from inspection of the accompanying drawings taken in connection with the following specification wherein like numerals refer to like parts throughout.

In the drawings

Fig. 1 is a view in perspective of a refrigerating unit manufactured in accordance with the present invention and shown in use in a modern household refrigerator;

Fig. 2 is a vertical section taken substantially along the line 2—2 of Fig. 1;

Fig. 3 is a vertical section taken substantially along line 3—3 of Fig. 2;

Fig. 4 is a side elevation of a shelf and coil arrangement separated from the refrigerator box;

Fig. 5 is a horizontal section taken substantially along the line 5—5 of Fig. 4;

Fig. 6 is a vertical section taken substantially along line 6—6 of Fig. 5;

Fig. 7 is an enlarged detail view in perspective of a portion of a shelf and the coil assembled thereon; and

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Fig. 8 is a schematic diagram of the coil arrangement.

In Figs. 1 to 3 inclusive the present invention is illustrated in a household refrigerator comprising a food storage compartment, a lower machine compartment, and an insulating partition therebetween, but it is to be appreciated that the machine compartment could be above, below or at the side of the storage compartment without departing from my invention. The refrigerating system comprises a condensing unit including a sealed compressor 10, a condenser 11, and a condenser cooling fan 12, all of which are mounted upon a suitably supported standard 13 adapted to be slid into the machine compartment. The refrigerant which is compressed and condensed in the condensing unit flows to an expansion coil arranged in the food compartment through a section of capillary tubing 16, the diameter and length of which being such as properly to control expansion of the refrigerant for the particular system. Expanded refrigerant comes back to the condensing unit through a suction tube 17. Other suitable forms of refrigerating system may be substituted for that herein illustrated, such as a system in which the capillary tube is replaced by a thermostatically controlled expansion valve.

My present invention contemplates connection of the expansion coil to the condensing unit by means of a liquid or discharge line 15 and a gas or suction line 17, both of which pass through a removable section of a wall of the food compartment so that the entire assembly may be inserted or removed as a unit. This removable section preferably comprises a short section of insulating material 18 adapted to surround the suction pipe 17, and having a slot therein embracing the discharge tube 16 so as to insulate one from the other and close the gap in the wall of the refrigerating unit. A square pad of foam rubber or the like is suitable for the purpose inasmuch as it will deform and completely fill the recess in the wall of the food compartment through which the tubes pass. In order that it may be removably associated with the wall, the pad is wrapped about the tubes and held in position by a removable plate 19 bridging the recess in the wall and held in place by screws 20 or the like.

The evaporator shelf assembly comprises a lower shelf 21, intermediate shelves 22 and an upper shelf 23, all of the shelves having peripheral flanges depending therefrom. The forward edges of the shelves are joined together by posts 24 welded or bolted thereto, and the rear corners

of the shelves are joined together by channel member 25. As seen in Fig. 5, the capillary tube 16 is preferably inserted into and fixed to the end of a tube 30 of substantially the same diameter as the tube 17. Referring to Fig. 8, it may be seen that the tube 30 may rise to a point adjacent the upper shelf 23 and pass inwardly through the flange thereof, and join a serpentine coil 31 arranged beneath the shelf. The tube thereafter passes outwardly and down behind the left channel member 25 as indicated at 32. The tube 32 passes inwardly through the flange of the lower shelf 21 and joins a serpentine coil 33, then outwardly to rise to a point adjacent the second shelf 22, the riser being indicated by the numeral 34. The tube here passes inwardly beneath the second shelf 22 and is joined to a serpentine coil 35 followed by a riser 36 behind the right channel member 25. From there is passes beneath the upper intermediate shelf 22 to join a serpentine coil 37 from which a short section extends into the lower end of an accumulator 38 also mounted behind the right channel member 25. The upper end of the accumulator opens into the upper end of the tube 17 which returns to the condensing unit.

As seen more clearly, in Figs. 6 and 7, I prefer to affix the serpentine coils to the lower surface of the shelves as by means of inverted channel members 40 having longitudinally extending flanges 41, which may be welded or soldered to the tubes and to the lower surfaces of the shelves in order to have firm contact and good heat transference, as well as to eliminate rattling or humming otherwise transmitted through the tubes from the condensing unit.

The tubes are protected from damage by the flanges of the shelves and the members 25, and a neat attractive assembly is thus provided.

Having illustrated and described a preferred embodiment of the present invention, it should be apparent to those skilled in the art that the invention permits of modifications in detail and arrangement. All such modifications as come within the scope of the appended claims are considered to be a part of my invention.

I claim:

1. A shelf assembly for insertion in a refrigerator box having a rectangular food compartment comprising a plurality of upright channel members and horizontal shelves affixed thereto, said members being angularly disposed with respect to the edges of said shelves at the rear corners thereof whereby, when said shelf assembly is slipped into position in said rectangular compartment, the walls of said compartment and said upright members define enclosed, hollow spaces for the reception and concealment of refrigerant-carrying tubes.

2. A refrigerator cabinet comprising a rectangular food compartment, and a shelf assembly positioned in said compartment, said shelf assembly comprising a plurality of upright members, a plurality of shelves supported by said members, a plurality of refrigeration coils individually mounted on said shelves, and vertical tube sections connecting said coils, certain of said upright members comprising plates positioned angularly with respect to the side and rear edges of said shelves whereby said plates form enclosed, hollow spaces at the rear, vertical corners of said food compartment, and said vertical tube sections being positioned in said spaces.

3. A refrigeration system for a household refrigerator having a rectangular food storage compartment comprising a condensing unit and an evaporator unit, said units being joined together in refrigerant-flow relationship, said evaporator unit comprising a shelf assembly adapted to be slipped into said food storage compartment, said assembly comprising a plurality of horizontal shelves and a plurality of uprights affixed thereto, certain of said uprights comprising angularly disposed rear corner posts adapted to form with the upright walls of said food storage compartment enclosed, hollow spaces through which portions of the evaporator unit may pass vertically from shelf to shelf.

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REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
1,921,576	Muffly	Aug. 8, 1933
2,007,701	Apple	July 9, 1935
2,399,963	Vinton	May 7, 1946
2,399,967	West	May 7, 1946