Feb. 21, 1950 E. O. SEARS 2,498,379

REFRIGERATOR

Filed May 11, 1946

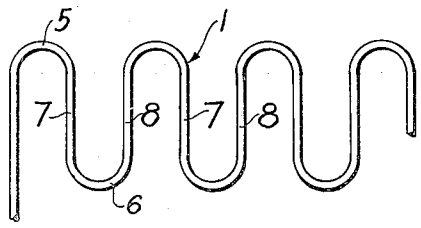


Fig. 3

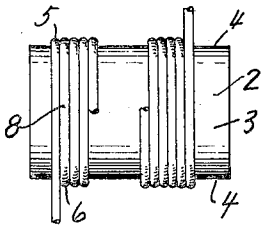


Fig. 1

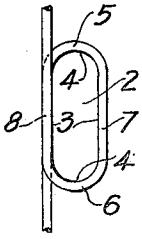


Fig. 2

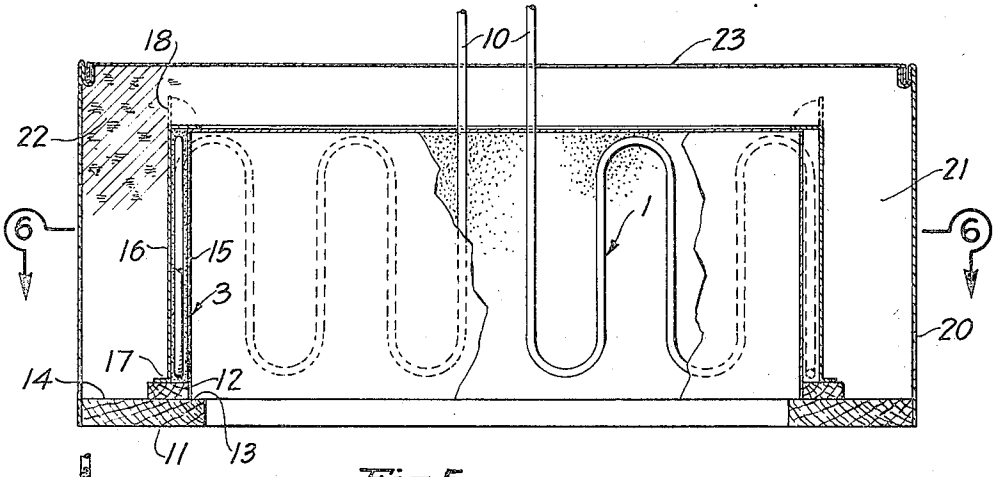


Fig. 5

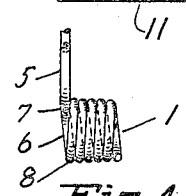


Fig. 4

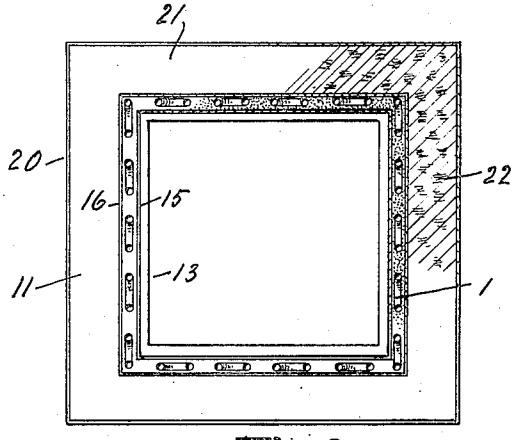


Fig. 6

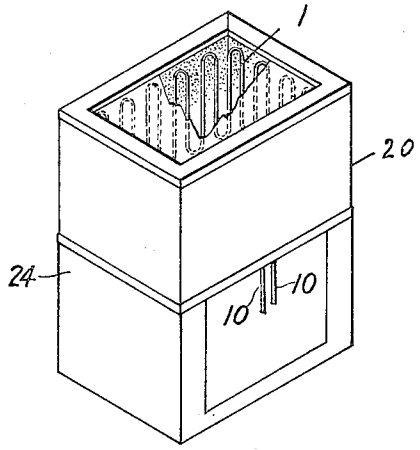


Fig. 7

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REFRIGERATOR

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4 Claims. (Cl. 62—99)

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The present invention relates to improvements in refrigerators, and has particular reference to the construction of a frozen food cabinet, although the principles involved may be used in other refrigerators in which the evaporator is mounted in the side walls of the cabinet.

More particularly it is proposed to provide a wall construction for a cabinet of the character described in which the evaporator coil may be lowered into a hollow space in the side wall as a unit, and may be held in place by a suitable cement, which can be applied by a simple pouring operation.

It is a further object of my invention to provide a preformed coil made of a single length of tubing which is bent and twisted into the desired shape without any undue bending or twisting stresses, and which may readily be stretched or contracted in the manner of an accordion to provide a desired degree of cooling effect.

It is further proposed to provide a simple method of making a coil of the character described.

And finally it is proposed to provide a frozen food cabinet construction which can be assembled by unskilled labor with a minimum of effort, in which there are no hidden joints, and which can be manufactured economically and in such a manner as to insure perfect heat exchange.

Further objects and advantages of my invention will appear as the specification proceeds, and the new and useful features of my construction will be fully defined in the claims attached hereto.

The preferred form of my invention is illustrated in the accompanying drawing, forming part of this application, in which:

Figure 1 illustrates the first step in making the coil by winding a tube upon a mandrel, the latter being shown in side elevation;

Figure 2 illustrates the same step in end elevation;

Figure 3 shows a portion of the coil in final form;

Figure 4 illustrates one step in the development of the coil;

Figure 5 shows a vertical section through a cabinet made in accordance with my invention, certain portions being broken away;

Figure 6, a horizontal section on a reduced scale taken along line 6—6 of Figure 5; and

Figure 7, an isometric view of a completed cabinet, of slightly different form, portions being broken away.

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While I have shown only the preferred form of my invention, it should be understood that various changes or modification may be made within the scope of the claims hereto attached without departing from the spirit of the invention.

Referring to the drawing in detail, my coil 1 is made of a single length of tubing, which latter is preferably made of copper or similar material.

As a first step, I wind the tubing upon a mandrel 2, which is substantially eliptical in cross-section, and having parallel side edges 3 and curved or semi-circular upper and lower edges 4, the total height of the mandrel corresponding substantially to the height of the chamber in which the coil is to be installed, and the width of the mandrel corresponding substantially to the desired spacing between the vertical strands of the finished coil.

After the tubing has thus been wound, in the manner shown in Figures 1 and 2, the mandrel is removed from within the coil.

Next, the operator grips, with one hand, the upper curved end 5 of the first turn, and with the other hand, the lower curved end 6 of the same turn, and revolves the upper end about the intervening vertical strand 7 through an angle of 180 degrees, thereby bringing the upper end into the transverse plane of the lower end, as illustrated in Figure 4.

The entire turning movement thus takes place in the intervening vertical strand 7, which is amply capable of withstanding the twisting stress.

In the second step the operator retains his hold on the lower curved end 6 and, gripping the next upper end with his free hand, revolves the lower end about the second upright strand 8 through an angle of 180 degrees in the reverse direction, thus bringing the upper and lower ends of the first turn into the transverse plane of the upper end of the second turn.

Continuing this operation of alternately revolving the free end of the tubing about the pivotal uprights in opposite directions, the operator finally arrives at the wave shape shown in Figure 3, in which all the curved upper and lower ends 5 and 6 lie in the same plane and all the upright strands 7 and 8 are substantially parallel.

It will be readily understood that the overall length of the coil, or that of any intermediate section thereof, may be easily expanded or contracted in the manner of an accordion. Again,

while originally the entire coil stretches in a single plane, it may be readily turned to any desired box-like shape by again using the vertical strands 7 and 8 as pivot members.

Thus, if the coil is to be used in connection with a rectangular cabinet having a hollow wall, the operator may measure off the lengths of the four walls against the coil, select properly spaced uprights for corner pieces, and turn the coil on these uprights to produce a rectangle similar to that of the cabinet, and adapted to be lowered into the hollow wall as a unit.

In actual manufacturing, these dimensions will, of course, be predetermined, and the coil will be laid out to fit a cabinet of a pre-determined size.

The two ends of the coil should be made to emerge from the square formation in adjacent and parallel relation, as shown at 10.

In making the cabinet, the operator proceeds as follows:

He first places a rectangular or square frame 11 on the floor or any other supporting surface, the frame being preferably made of wood. A second frame 12 is then placed on top of the first frame so as to leave an inside ledge 13 and an outside ledge 14, the second frame being of much smaller cross-section.

Next, the operator places a rectangular shell 15 of sheet metal on the inner ledge, the bottom edge of the shell fitting against the frame 12 and being secured thereto. A second shell 16 of slightly larger dimensions is telescoped over the first shell to rest on the frame 12, and is provided with a bottom flange 17 which may be nailed to the frame.

The two shells thus form a hollow wall, the spacing between the shells being slightly in excess of the thickness of the tube to be used. The upper end of the outer shell projects slightly beyond that of the inner shell, as indicated in dotted lines at 18.

The coil 1, having previously been made in the manner hereinabove described, is then lowered into the square or chamber between the two shells, as in the position shown in Figure 5, with the two ends 10 projecting upward.

Next cement is applied to fill in the space around the coil. This cement should be prepared to have heat-conducting properties, because a certain amount will work in between the coil and the inner shell. It may be easily applied by pouring, since the projecting upper end of the outer shell serves as a retaining wall.

After the chamber or space containing the coil has been filled with cement, and the latter has set, the projections 18 are turned down on the chamber so as to form a cover for the cement, as shown.

Thereupon, a third shell 20, of considerably larger dimensions, and preferably made of stainless steel, is telescoped over the assembly thus far described, and is secured upon the outside of the frame 11.

This shell 20 forms a wide rectangular chamber 21 with the shell structure previously described, and also projects upwardly beyond the shell structure a considerable distance. All of the space is filled with suitable insulating material 22, and finally a top sheet 23 is secured upon the rim of the outer shell to cover the insulating material, the two ends 10 of the coil being made to extend through the top sheet.

The entire structure shown in Figure 5 is then turned upside down and is placed on a suitable supporting frame 24 in which the refrigerating apparatus (not shown) is housed, the two ends 10 of the evaporator coil extending into the supporting frame ready for connection with the refrigeration circuit.

It will be noted that all of the operations herein described; the winding of the tube on the mandrel, the opening of the windings into wave-shape, as shown in Figure 3, the bending of the coil into a square or rectangle, and the lowering of the completed coil into the shell structure, are simple in character, require no skilled labor, and can be carried out at little expense.

The bending and twisting stresses involved are such as to be readily assumed by the material, and there are no joints in the entire evaporator.

The number of turns of coil necessary for the size of the cabinet will depend upon desired heat exchange effects, but it will be readily seen that the coil may be easily contracted or expanded to meet desired conditions.

In most operations, the coil will, of course, be properly dimensioned to fit into the shell structure, with upright strands occupying the corners of the shell structure, as shown.

I claim:

1. A structure for a refrigerator, comprising a flat bottom frame having a rectangular opening, a second frame superimposed thereon and dimensioned to recede from the inner and outer edges of the first frame, two shells secured to the second frame in telescoping relation to form a rectangular chamber, a refrigerating coil accommodated in said chamber, a top closure for the two shells, a third rectangular shell secured upon the outer edge of the first frame and projecting above the first two shells to form a second chamber around and above the said shells, insulating material disposed in the second chamber, and a cover for the third shell, the first frame forming a door opening for the structure when the latter is turned upside down.

2. A structure as defined in claim 1, in which the coil is made in one piece and shaped for lowering into the first chamber as a unit.

3. A structure as defined in claim 1, in which the coil is made in one piece and shaped for lowering into the first chamber as a unit, and has parallel ends projecting upward from the chamber in closely spaced relation so as to extend downwardly upon reversing the structure.

4. A structure as defined in claim 1, in which the coil comprises a single tube bent to present a continuous wave formation with vertical stretches alternating with curved top and bottom stretches and with selected vertical stretches disposed in the corners of the chamber.

EDWARD ONEAL SEARS.

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