

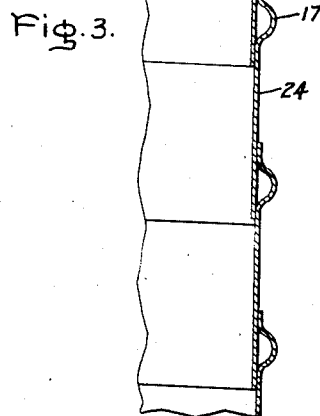
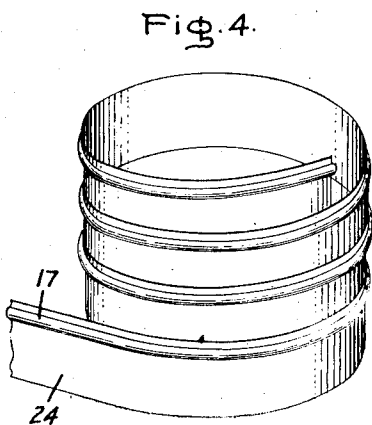
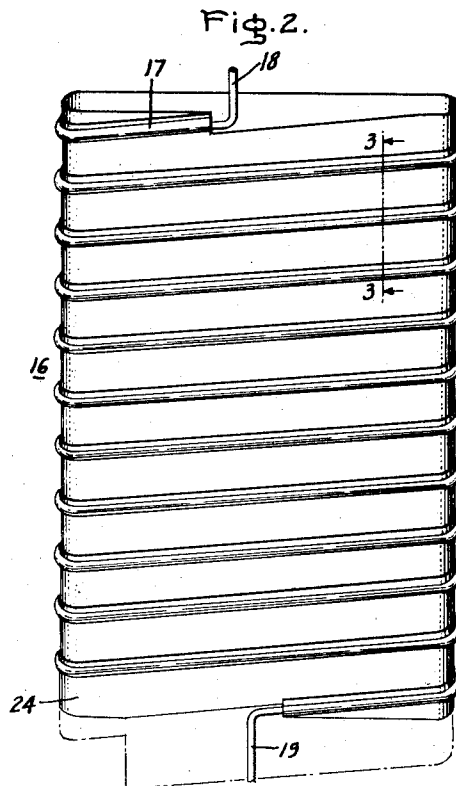
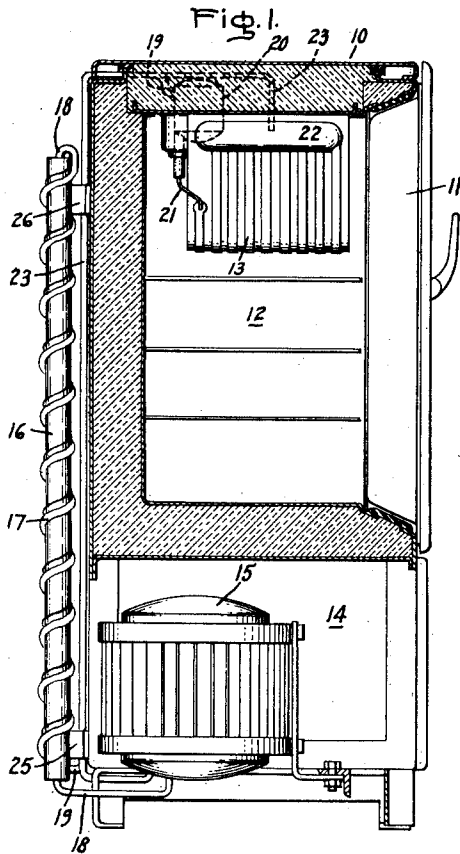
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REFRIGERANT CONDENSER AND METHOD OF FORMING SAME

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REFRIGERANT CONDENSER AND METHOD
OF FORMING SAMELeonard W. Atchison, Schenectady, N. Y., assign-
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7 Claims. (Cl. 118-118)

My invention relates to refrigerant condensers or similar heat exchangers and particularly to an air cooled condenser of the chimney type arranged to be mounted on the back of a household refrigerator.

It is an object of my invention to provide an improved heat exchanger or condenser of the chimney type for refrigerating machines.

Another object of my invention is to provide an improved method for constructing a condenser for a refrigerating machine.

Further objects and advantages of my invention will become apparent as the following description proceeds, and the features of novelty which characterize my invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

For a better understanding of my invention reference may be had to the accompanying drawing in which Fig. 1 is a side elevation view partly in section of a household refrigerator including a refrigerating machine provided with a condenser embodying my invention; Fig. 2 is a front perspective view of the condenser shown in Fig. 1; Fig. 3 is an enlarged sectional view on the line 3-3 of Fig. 2; and Fig. 4 is a perspective view of a portion of the condenser shown in Fig. 2 during one step of its manufacture.

Briefly, the household refrigerator shown in the drawing comprises a thermally insulated cabinet provided with a mechanical refrigerating machine of the compression type which includes an air cooled condenser mounted on the back wall of the cabinet. The condenser comprises a hollow chimney-like sheet metal structure of elongated substantially rectangular cross section. The condenser is constructed by providing a corrugation along one edge of a strip of sheet metal and then winding the strip helically to form a cylindrical structure, the edges of the strip overlapping so that the corrugation cooperates with the edge it overlaps to form a helical refrigerant passageway or conduit. The edges of the strip are welded or otherwise suitably bonded together along the edges of the corrugation in order to seal the refrigerant conduit. The cylindrical structure is flattened to provide a duct or flue of the desired shape having a relatively thin flat cross section and is provided with suitable connections for the admission and withdrawal of refrigerant.

Referring now to the drawing, the refrigerating machine shown in Fig. 1 comprises a thermally insulated cabinet 10 provided with a door 11 and having a food compartment 12 cooled by an

evaporator 13 and a machinery compartment 14 below the food compartment and in which is located a hermetically sealed motor compressor unit 15. An upright chimney type condenser 16 having a helical refrigerant conduit 17 is mounted at the back of the cabinet so that air may circulate therethrough and over the outside thereof, air from the machinery compartment circulating upwardly between the back of the cabinet and the front wall of the condenser. Hot compressed refrigerant is delivered from the motor compressor unit 15 through a connection 18 which extends upwardly through the chimney of the condenser 16 and discharges the refrigerant to condenser conduit 17 at the top thereof. The refrigerant is cooled by the circulation of air over the condenser and is liquefied and flows to the bottom of the condenser and thence through a liquid line 19 to a liquid receiver or float valve chamber 20 mounted in the upper portion of the cabinet 10. Refrigerant flows from the chamber 20 under the control of the float therein and enters the evaporator 13 through a connection 21. Liquid refrigerant is vaporized in the evaporator and the gaseous refrigerant collects in a header 22 from which it is withdrawn through a suction line 23 and is returned to the compressor in the casing 15.

As shown in Fig. 2 the condenser 16 comprises a sheet metal strip 24 wound helically with its edges overlapping as shown in Fig. 3. The top overlapping edge of the strip is provided with a corrugation which forms the conduit 17 and the edges of the strip are welded, brazed, or otherwise suitably bonded together along both edges of the corrugation 17 so that the concave side of the corrugation faces the adjacent edge of the next turn of the helically wound strip and forms a continuous helical conduit. An inlet connection comprising the end of the conduit 18 is connected to the conduit 17 at the top thereof and an outlet connection comprising the end of the conduit 19 is secured in communication with the bottom end of the conduit 17.

When constructing the chimney type condenser 16 I have found it preferable to form the corrugation along one edge of a strip of sheet metal, then to wind the strip in helical form with the concave side of the corrugation overlapping the adjacent turn of the strip as shown in Fig. 4, thereby forming a substantially cylindrical structure. The strip is welded together along both edges of the corrugation 17 to form a rigid structure and to seal the corrugation and provide a continuous helical refrigerant conduit. After a

sufficient length of the strip has been wound in cylindrical form, the structure is flattened to provide the condenser of substantially rectangular cross section as indicated in Figs. 1 and 2, and the strip at the ends is then cut off substantially at right angles to the longitudinal axis of the condenser as indicated at the bottom of Fig. 2 where the portion to be removed is shown in the dot and dash outline. The connections 18 and 19 are thereafter silver soldered or otherwise suitably secured and sealed in position at the ends of conduit 17. The condenser structure is then mounted on the rear of the cabinet 10 by suitable brackets at 25 and 26.

In some cases it may be found desirable to cut off or trim the ends of the strip 24 at an angle to remove the end portions at the top and bottom corresponding to the bottom portion shown in the dotted outline in Fig. 2, so that when the strip has been wound helically and welded at the edges of the strip, the ends are already formed so that they lie in the desired plane perpendicular to the longitudinal axis of the cylinder.

From the foregoing it is readily apparent that I have provided a condenser or heat exchanger of simplified construction which requires a minimum amount of material and which provides a rigid structure providing an extended surface for the rapid exchange of heat with the surrounding air that circulates over the condenser by natural draft.

While I have described a particular embodiment of my invention in connection with a household refrigerator, other applications will be apparent to those skilled in the art. I do not, therefore, desire my invention to be limited to the particular construction shown and described, and I intend in the accompanying claims to cover all modifications within the spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A heat exchange element for a refrigerating machine comprising a helically wound strip of sheet metal having its adjacent edges overlapping, at least one of said overlapping edges being formed with an elongated corrugation providing a passageway for fluid between said adjacent edges and extending helically about said element, said edges being bonded together on both sides of said corrugation to seal said passageway and to provide a rigid structure.

2. A chimney type condenser for a refrigerating machine comprising a helically wound strip of sheet metal having its adjacent edges overlapping, at least one of said overlapping edges being formed with an elongated corrugation providing a passageway for fluid between said adjacent edges and extending helically about said condenser, said edges being bonded together along both edges of said corrugation to seal said passageway and to provide a rigid structure forming a chimney of relatively thin flat cross section and being adapted to be mounted on a refrigerator cabinet and to induce a natural circulation of air over the surface of said condenser.

3. The method of manufacturing from a metal strip a condenser for a refrigerating machine which comprises, forming a corrugation along one edge of the strip, winding the strip helically

in a substantially cylindrical form with the concave side of said corrugation overlapping the adjacent portion of the other edge of the strip, and welding the edges of the strip together along both edges of said corrugation to form a continuous helical passageway for fluid.

4. The method of manufacturing from a metal strip a condenser for a refrigerating machine which comprises, forming a corrugation along one edge of the strip, winding the strip helically into a structure of substantially cylindrical form with the concave side of said corrugation overlapping the adjacent portion of the other edge of the strip, welding the edges of the strip together along both edges of said corrugation to form a continuous helical passageway for fluid and flattening said structure to provide a duct or flue of substantially rectangular cross section.

5. The method of manufacturing from a metal strip a condenser for a refrigerating machine which comprises, forming a corrugation along one edge of the strip, winding the strip helically into a structure of substantially cylindrical form with the concave side of said corrugation overlapping the adjacent portion of the other edge of the strip, welding the edges of the strip together along both edges of said corrugation to form a continuous helical conduit, and as a step in said method after the formation of said structure cutting off the ends of said structure in a plane substantially at right angles to the axis thereof and attaching fittings to said conduit for the admission and discharge of refrigerant.

6. The method of manufacturing from a metal strip a condenser for a refrigerating machine which comprises, cutting the strip to a predetermined length and cutting the predetermined length of the strip adjacent its ends to predetermine the shape of the ends of the condenser, forming a corrugation along one edge of the strip, winding the strip helically into a structure of substantially cylindrical form with the concave side of said corrugation overlapping the adjacent portion of the other edge of the strip, welding the edges of the strip together along both edges of said corrugation to form a continuous helical conduit, deforming the cylindrical structure to provide the desired shape of cross section of the condenser, and attaching fittings to the ends of said conduit for the admission and discharge of refrigerant.

7. A chimney type condenser for a refrigerating machine comprising a helically wound strip of sheet metal having its adjacent edges overlapping, at least one of said overlapping edges being formed within an elongated corrugation providing a passageway for fluid between said adjacent edges and extending helically about said condenser, said edges being welded together along both edges of said corrugation to seal said passageway and to provide a rigid structure forming a chimney of relatively thin flat cross section and being adapted to be mounted on a refrigerator cabinet, a refrigerant inlet fitting attached to communicate with said passageway at one end thereof, and a refrigerant outlet fitting connected in communication with said passageway at the other end thereof.

LEONARD W. ATCHISON.