Oct. 22, 1957 C. H. WURTZ ET AL 2,810,266

REFRIGERATOR CABINET STRUCTURE

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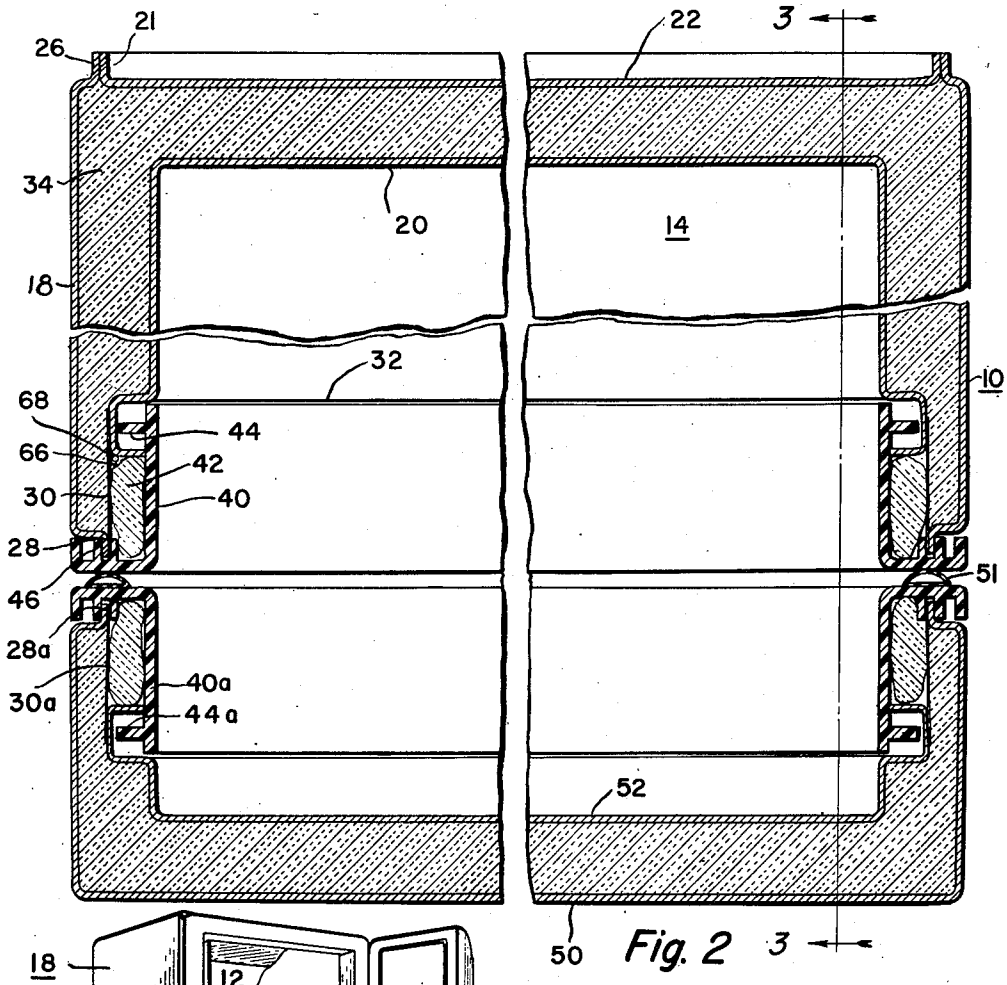

Fig. 2

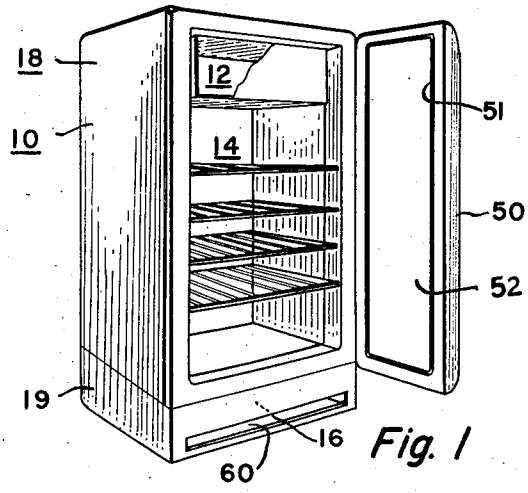

Fig. 1

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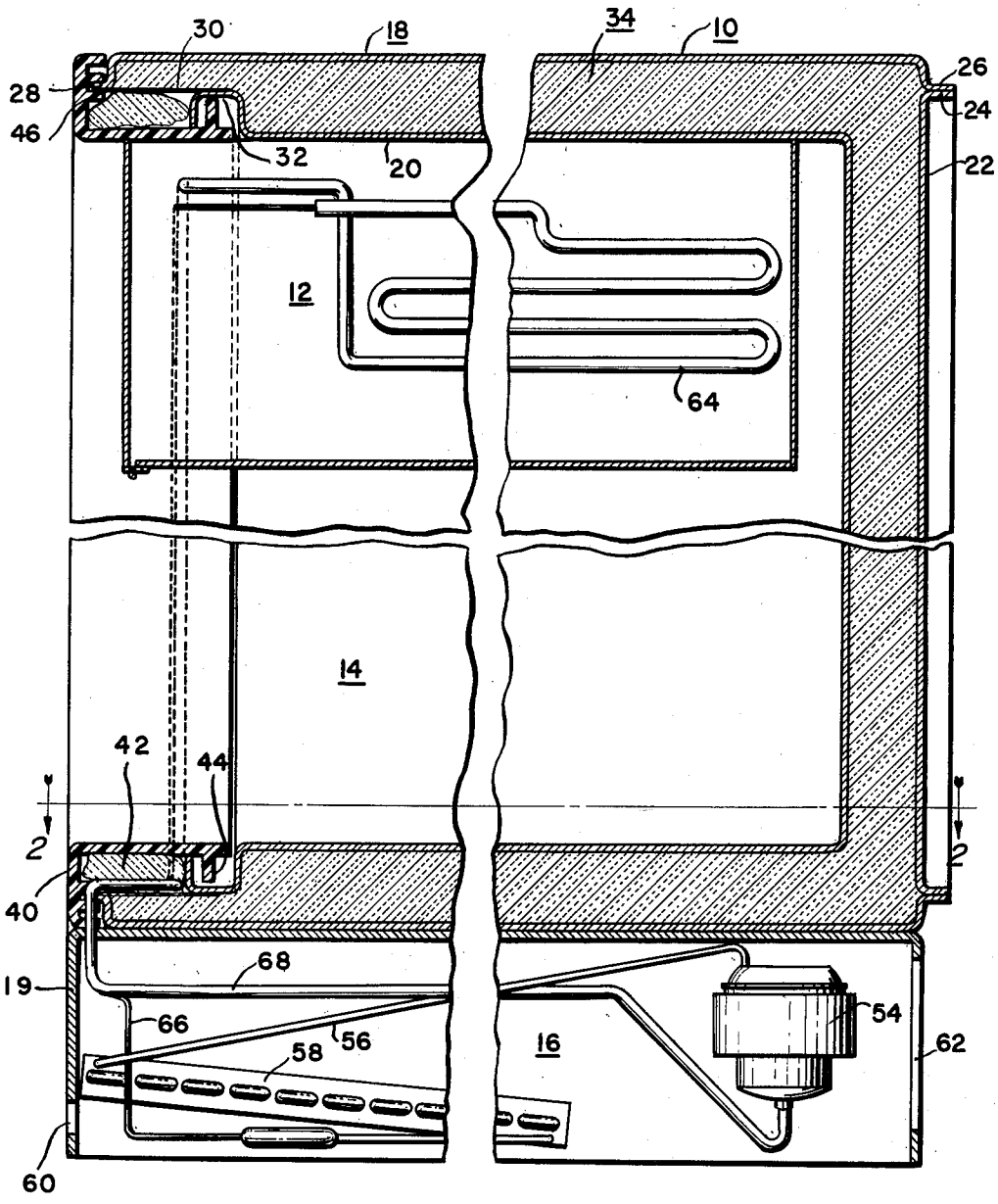

Fig. 3

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REFRIGERATOR CABINET STRUCTURE

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Application November 12, 1954, Serial No. 468,448

3 Claims. (Cl. 62—89)

This invention relates to refrigerating apparatus and more particularly to a thin walled refrigerator cabinet construction.

It is an object of this invention to provide an improved cabinet construction which reduces the required thickness of the walls thereof and which lends itself to low-cost mass production.

Another object of this invention is to provide a cabinet in which an improved type of heat transfer barrier is provided between the inner shell and the outer shell and in which the barrier seals the opening between the shells.

Still another object of this invention is to provide a strong and durable all metal joint between the inner shell and the outer shell adjacent the door opening. More particularly it is an object of this invention to utilize a relatively thin ribbon of stainless steel having its edges roll-welded to the front edges of the inner and outer shells for sealing the opening between these shells.

Still another object of this invention is to provide an improved refrigerator door construction.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the present invention is clearly shown.

In the drawings:

Figure 1 is a perspective view showing a refrigerator cabinet constructed in accordance with the invention;

Figure 2 is a horizontal sectional view taken substantially on line 2—2 of Figure 3 and showing a refrigerator cabinet constructed in accordance with the invention; and,

Figure 3 is a vertical sectional view taken substantially on line 3—3 of Figure 2.

Referring now to the drawings wherein a preferred embodiment of the invention has been shown, reference numeral 10 generally designates a household refrigerator having a frozen food storage compartment 12, an unfrozen food storage compartment 14 and a machinery compartment 16. The main cabinet comprises an outer shell portion 18 and an inner shell 20. The machinery compartment consists of a separate sheet metal housing 19 on which the outer shell 18 rests as shown. The outer shell 18 is of the wrap-around type and is made of one continuous band of sheet metal which forms the top, bottom, and two side walls of the refrigerated space. The rear wall of the refrigerated space comprises a panel element 22 which is provided with a flange 24 complementary to a flange 26 provided on the outer shell portion 18. The flanges 24 and 26 project to the rear of the cabinet so that they may be conveniently roll-welded to one another so as to provide a gas-tight joint between the outer shell section 18 and the rear panel 22.

The outer shell portion 18 is provided with a flange 28 adjacent the front edge which projects forwardly as shown. In order to provide a gas-tight joint between the front edge of the outer shell 18 and the front edge of the inner shell 20 and in order to reduce the transfer of heat between the inner and outer shells, there is provided a thin metallic ribbon 30 which has its front edge roll-welded

to the flange 28 on the outer shell 18 and which has its inner edge roll-welded to the flange 32 provided on the inner shell 20. The ribbon is preferably made of chrome nickel steel known as stainless steel or nickel steel or any other suitable material having low conductivity and susceptible of having its edges welded to the inner and outer liners. By virtue of the small cross-sectional area of the metallic ribbon 30 and by virtue of the low coefficient of heat transfer of stainless steel the heat leakage at this point is kept at a minimum. The stainless steel strip, however, provides the necessary mechanical strength to properly hold the inner liner in place. A stainless steel having approximately 18% chrome and 8% nickel is preferably used. This steel is commonly referred to as S. A. E. 403 steel.

The space between the inner liner 20 and the outer shell 18 and the rear panel 22 is filled with a powdered or fibrous insulating material 34 which also helps to support and hold the inner liner in place. In order to reduce the conduction of heat through the insulating material 34 the space occupied by the insulating material is first evacuated of gas and then filled with a gas having poor heat transmitting ability such as difluorodichloromethane, commonly known as F–12.

A suitable low conductivity trim strip or door opening molding 40 is provided adjacent the door opening so as to conceal the projecting flanges 28 and 32 and so as to reduce the transfer of heat between the metal walls adjacent the door opening and the air which would otherwise contact these walls. This trim strip is preferably in the form of a molded plastic member having a cross-section as shown. Bag type insulation 42 is inserted in the space between the trim strip 40 and the stainless steel ribbon portion 30 so as to reduce the heat leakage at this point. The bag type insulation 42 is preferably of the type shown in copending application Ser. No. 289,482, filed May 23, 1952, now Patent No. 2,779,066, by Richard S. Gaugler and Edmund F. Schweller, to which reference is hereby made for a more complete description of this type of insulation. As pointed out in this copending application, the insulation consists of outer laminated bags filled with suitable fibers and charged with a Freon refrigerant or some other suitable gas having a low heat transferability. The door for the refrigerator consists of an outer panel 50 and an inner panel 52 which is held in place relative to the outer panel 50 by means of a joint construction identical in construction to the joint construction between the outer shell portion 18 and the inner shell portion 20. In view of the similarity of the joint construction, the same reference numerals have been used to designate the corresponding parts, except that these numerals include the suffix *"a."* A gasket 51 is provided on the door to provide a good seal between the door and the door frame.

It will be noted that the breaker strip 40 is provided with a flange 44 adjacent its inner edge for reinforcing the flange. By thus reinforcing the flange it is possible to reduce the thickness of the molded element and still maintain the necessary rigidity. A pair of flanges 46 are provided as shown for engaging the flange 28 so as to properly position the molded element 40 relative to the cabinet.

In constructing the cabinet described hereinabove, the flanges 24 and 26 may be welded to one another before the inner liner and the insulation are installed. The stainless steel strip 30 has its one edge welded to the inner liner 20 before the inner liner is assembled within the outer shell and the insulation 34 is installed within the outer shell before the inner shell is inserted. After the inner shell and the insulation 34 have been installed, the front edge of the stainless steel strip 30 is then roll-welded to the flange 28 on the outer shell so as to complete the hermetically sealed chamber between the inner and outer shells. This chamber is then evacuated of gas and the

voids between the inner and outer shells and within the insulation are then filled with the insulating gas.

The refrigerating equipment comprises the usual sealed motor-compressor unit **54** which discharges the compressed gas through a line **56** leading to the usual condenser **58** located in the machinery compartment **16**. Condenser cooling air enters the machinery compartment through the front air inlet **60** and leaves through the rear outlet **62**. A refrigerant evaporator **64** of conventional construction is arranged in the freezer compartment **12** in accordance with standard practice and serves to maintain the freezing compartment **12** at a relatively low temperature and also serves to refrigerate the main food storage compartment **14**. A suitable access door serves to close the front entrance to the freezer compartment **12** in accordance with conventional practice. The liquid refrigerant from the condenser **58** flows to the evaporator through a capillary tube type restrictor **66** and the vaporized refrigerant flows from the evaporator **64** to the compressor **54** through the usual suction line **68**. As best shown in Figure 2 these lines are preferably arranged to pass from the machinery compartment **16** up to the evaporator through the space between the molded member **40** and the stainless steel strip **30** so as to be properly insulated from the ambient air.

While the form of embodiment of the invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted, as may come within the scope of the claims which follow.

What is claimed is as follows:

1. In a refrigerator having a door opening and having an inner shell and an outer shell spaced from one another, said outer shell comprising a wrap-around metallic member forming the sides, top and bottom walls of the outer shell and having a first offset flange adjacent its rear edge and a second offset flange adjacent said door opening and a rear panel welded to said first flange, said inner shell having a third offset flange adjacent said door opening and substantially in alignment with said second named flange, a relatively thin strip of stainless steel bridging the gap between said second and third flanges, said strip having its edges roll welded to said flanges so as to provide a hermetically sealed joint between said inner shell and said outer shell, an insulating gas having a lower coefficient of heat transfer than air disposed between said inner shell and said outer shell, a trim member adjacent said door opening arranged in spaced relationship to said strip so as to conceal said strip, and insulation disposed between said strip and said trim member.

2. In a refrigerator having a door opening and having an inner shell and an outer shell spaced from one another, said outer shell comprising a wrap-around metallic member forming the sides, top and bottom walls of the outer shell and having a first offset flange adjacent its rear edge and a second offset flange adjacent said door opening and a rear panel welded to said first flange, said inner shell having a third offset flange adjacent said door opening and substantially in alignment with said second named flange, a relatively thin strip of stainless steel bridging the gap between said second and third flanges, said strip having its edges roll welded to said flanges so as to provide a hermetically sealed joint between said inner shell and said outer shell, an insulating gas having a lower coefficient of heat transfer than air disposed between said inner shell and said outer shell, a trim member adjacent said door opening arranged in spaced relationship to said strip so as to conceal said strip, insulation disposed between said strip and said trim member, an evaporator within said inner shell, refrigerant liquefying apparatus outside said inner shell, and refrigerant flow connections between said evaporator and said refrigerant liquefying means, said connections including portions disposed between said strip and said insulation.

3. In a refrigerator having a door opening and having an inner shell and an outer shell spaced from one another, said outer shell comprising a wrap-around metallic member forming the sides, top and bottom walls of the outer shell and having a first offset flange adjacent said door opening, said inner shell having a second offset flange adjacent said door opening and substantially in alignment with said first named flange, a relatively thin strip of stainless steel bridging the gap between said first and second flanges, said strip having its edges roll welded to said flanges so as to provide a hermetically sealed joint between said inner shell and said outer shell, an insulating gas having a lower coefficient of heat tranfser than air disposed between said inner shell and said outer shell, a trim member adjacent said door opening arranged in spaced relationship to said strip so as to conceal said strip, and insulation disposed between said strip and said trim member.

References Cited in the file of this patent

UNITED STATES PATENTS

1,789,916	Thornton	Jan. 20, 1931
2,000,882	Comstock	May 7, 1935
2,065,608	Munters	Dec. 29, 1936
2,162,271	Munters	June 13, 1939
2,164,143	Munters	June 27, 1939
2,179,542	Claxton et al.	Nov. 14, 1939
2,205,778	Forsthoefel	June 25, 1940
2,622,754	Eagles	Dec. 23, 1952