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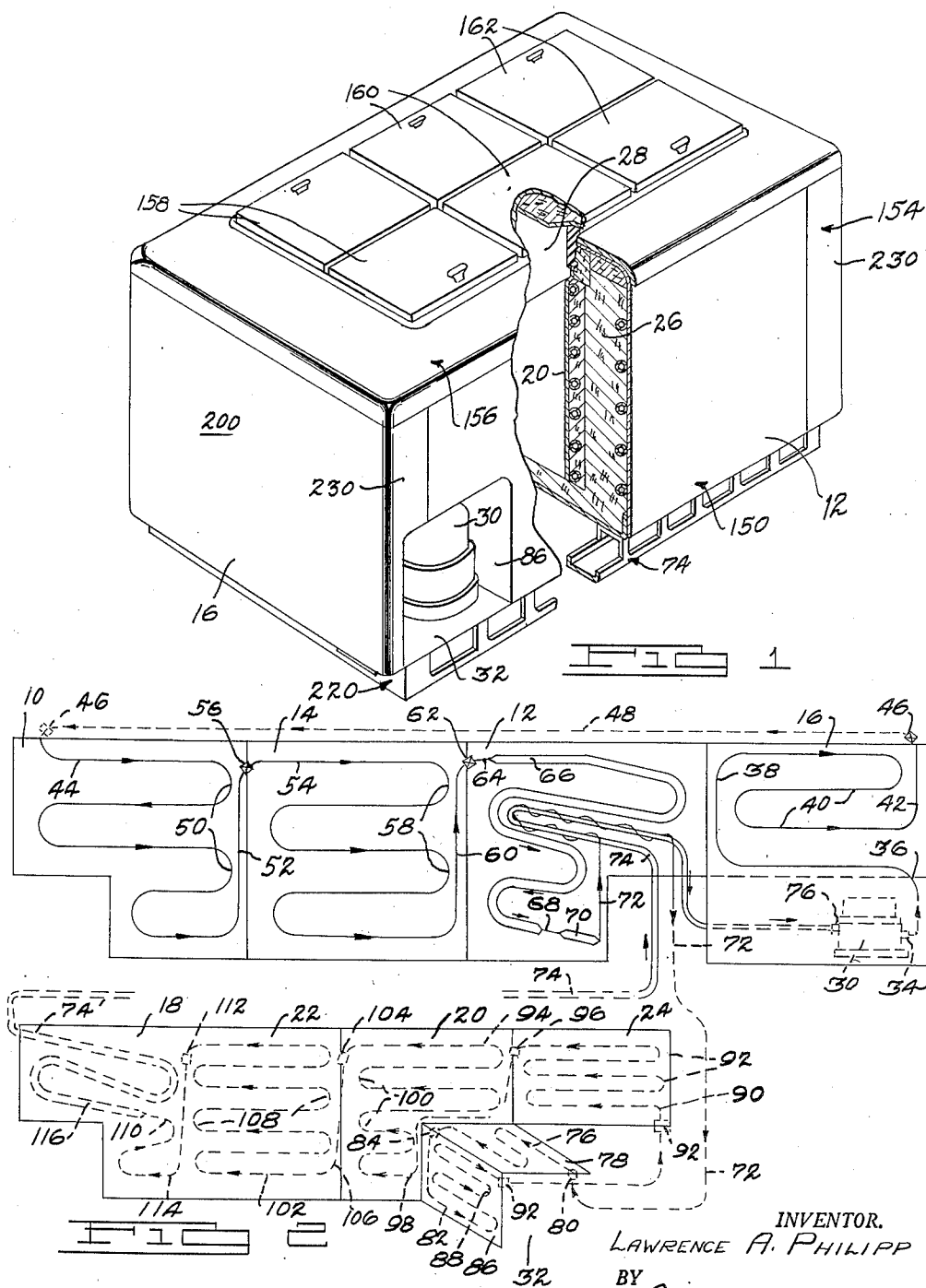
L. A. PHILIPP

2,622,753

SECTIONAL REFRIGERATOR CABINET

Original Filed Aug. 24, 1944

4 Sheets-Sheet 1



INVENTOR.
LAWRENCE A. PHILIPP
BY
Ralph E. Baker
ATTORNEY

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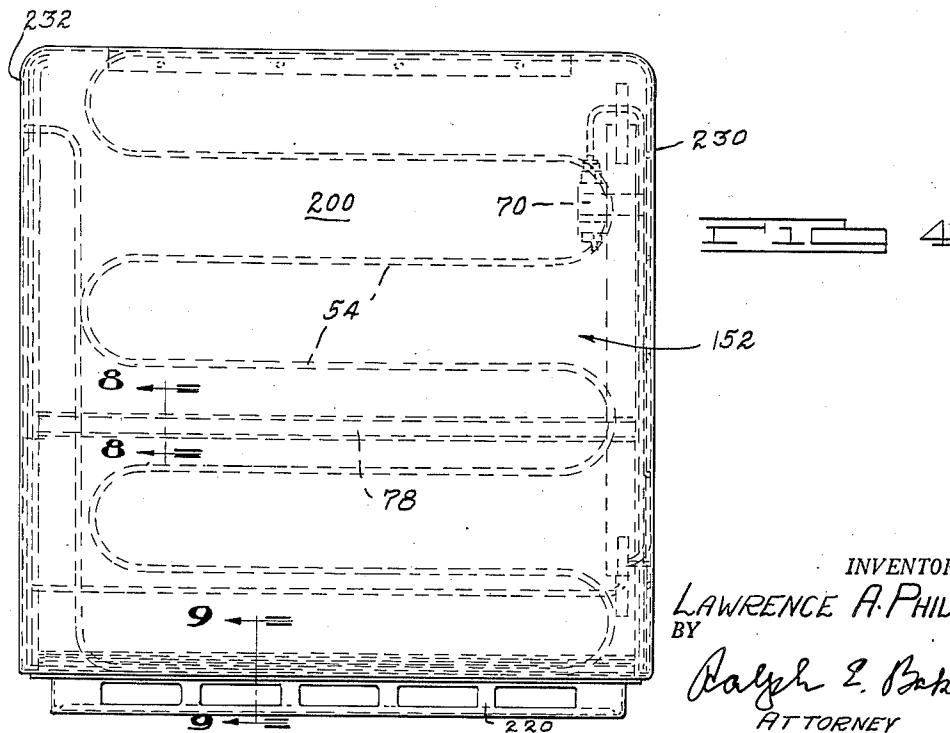
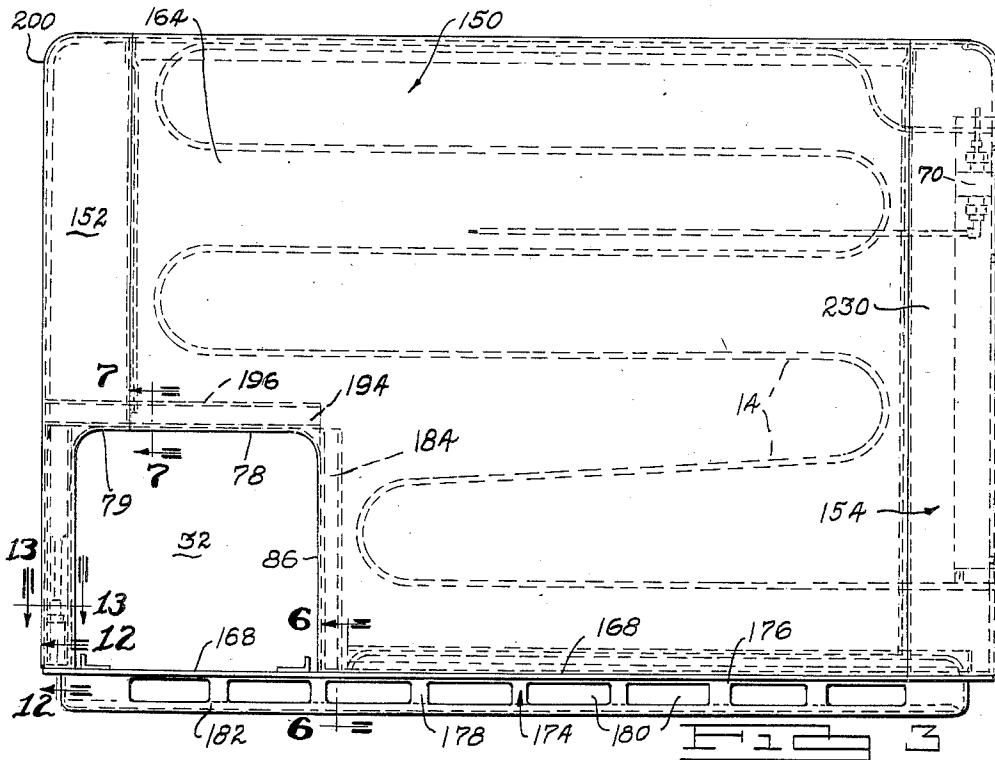
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INVENTOR.
LAWRENCE A. PHILIPP
BY
Ralph E. Baker
ATTORNEY

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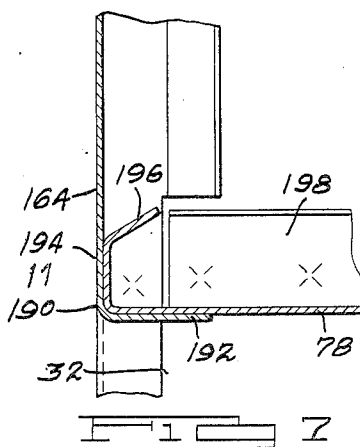
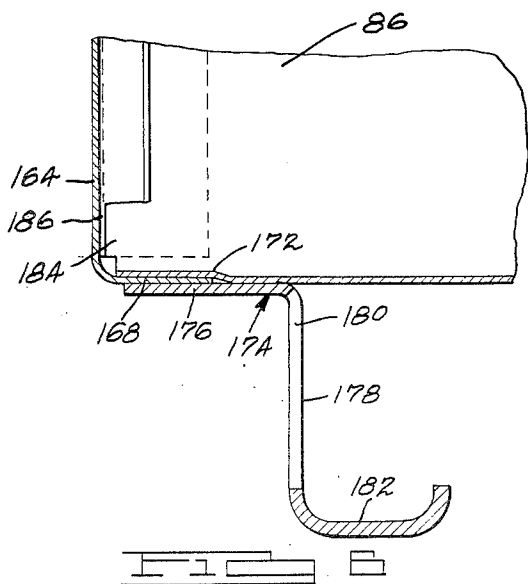
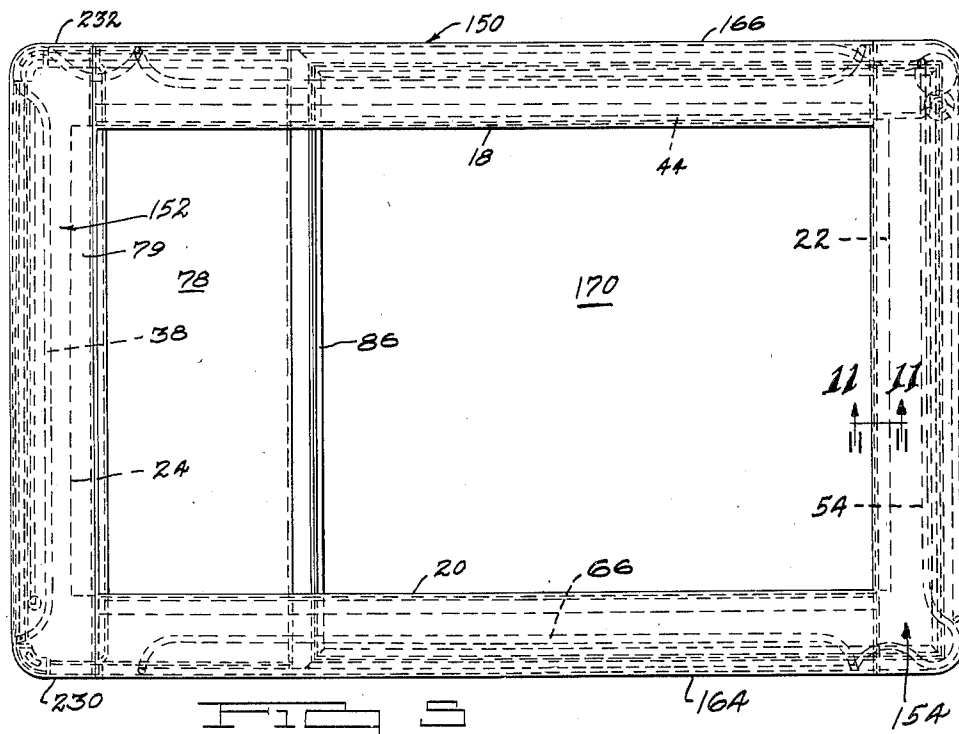
L. A. PHILIPP

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4 Sheets-Sheet 3



INVENTOR.

LAWRENCE A. PHILIPP

BY

Ralph E. Baker
ATTORNEY

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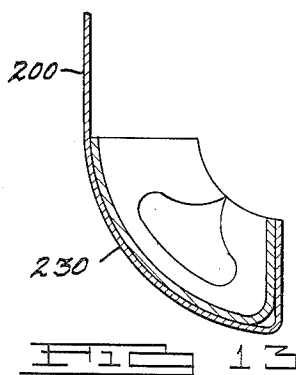
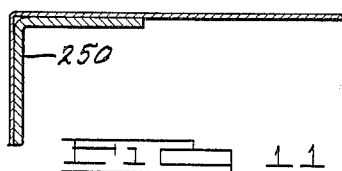
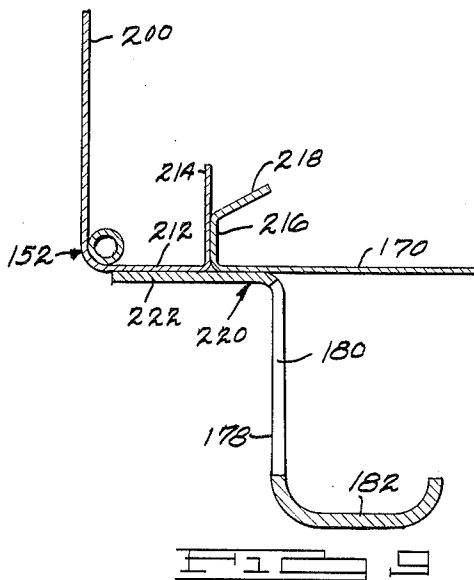
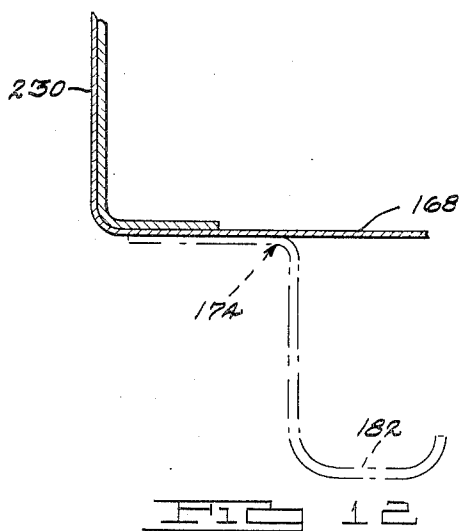
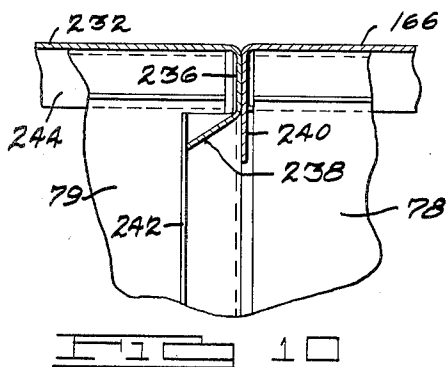
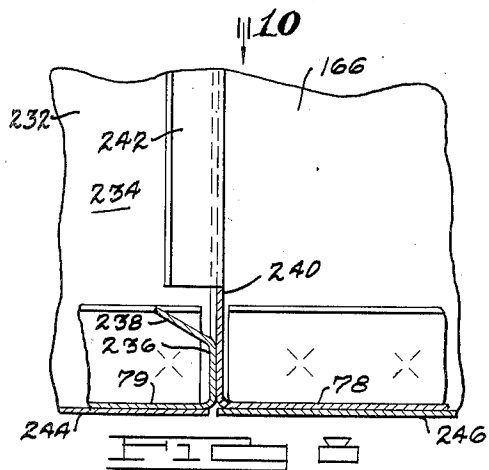
L. A. PHILIPP

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SECTIONAL REFRIGERATOR CABINET

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4 Sheets-Sheet 4



INVENTOR.

LAWRENCE A. PHILIPP

BY

Ralph E. Baker
ATTORNEY

UNITED STATES PATENT OFFICE

2,622,753

SECTIONAL REFRIGERATOR CABINET

Lawrence A. Philipp, Detroit, Mich., assignor to
Nash-Kelvinator Corporation, Detroit, Mich., a
corporation of Maryland

Original application August 24, 1944, Serial No.
550,920. Divided and this application October
26, 1948, Serial No. 56,605

3 Claims. (Cl. 220-4)

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This is a divisional application of my pending application Serial No. 550,920 filed August 24, 1944, now Patent Number 2,464,606.

This invention relates to refrigerating apparatus, and more particularly to such apparatus as is used for storing and dispensing frozen articles, such, for example, as ice cream, food stuffs, etc.

It is an object of the invention to provide an improved frozen food cabinet built up of a number of sub-assemblies formed of stamped metal sheets secured together as by welding to provide an improved cooler of rugged construction wherein maximum use is made of the space within the device.

A further object of the invention is to provide a cabinet for storing and dispensing frozen food stuffs wherein the cooler is formed of interconnected stamped sheets to provide a rigid efficient structure wherein selectively operable closure members positioned in the top are provided to permit ready access to spaced portions of the device in such a manner that minimum cold is lost from the storage compartment while dispensing food stuffs from the cabinet.

A still further object of the invention resides in the development of an improved method of fabricating a frozen food cabinet wherein refrigerant condensing and evaporating elements are secured to spaced walls or sub-assemblies, and are interconnected when the walls or sub-assemblies are joined together to provide a unitary cabinet having interconnected continuous refrigerant condensing and evaporating elements bonded to the walls to employ the entire surface of insulated outer and inner walls as refrigerant condensing and evaporating elements.

Other objects and advantages of this invention will be apparent from the following detailed description considered in connection with the accompanying drawings, submitted for purposes of illustration only and not intended to define the scope of the invention, reference being had for that purpose to the sub-joined claims.

In the drawings, wherein similar reference characters refer to similar parts throughout the several views:

Fig. 1 is an isometric view, partly broken away and in section, of a frozen food cabinet, embodying the present invention;

Fig. 2 is a schematic view of the refrigerating apparatus illustrating the relation of the refrigerant condensing and evaporating elements thereof;

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Fig. 3 is a front elevation of the cabinet illustrated in Fig. 1;

Fig. 4 is an end elevation of the cabinet;

Fig. 5 is a plan view of the cabinet illustrated in Fig. 1;

Fig. 6 is a fragmentary sectional view of the cabinet, taken substantially on the line 6-6 of Fig. 3;

Fig. 7 is a fragmentary sectional view of the cabinet, taken substantially on the line 7-7 of Fig. 3;

Fig. 8 is a fragmentary sectional view of the cabinet, taken substantially along the line 8-8 of Fig. 4;

Fig. 9 is a fragmentary sectional view of the cabinet, taken substantially along the line 9-9 of Fig. 4;

Fig. 10 is a fragmentary plan view of the cabinet, looking in the direction of arrow 10 of Fig. 8;

Fig. 11 is a fragmentary sectional view of the cabinet, taken substantially along the line 11-11 of Fig. 5;

Fig. 12 is a fragmentary sectional view of the cabinet, taken substantially along the line 12-12 of Fig. 3; and

Fig. 13 is a fragmentary sectional view of the cabinet, taken substantially along the line 13-13 of Fig. 3.

Referring now more particularly to Figs. 1 and 2, a frozen food cabinet is illustrated wherein back and front outer walls or panels 10 and 12 are interconnected by outer end walls or panels 14 and 16. The panels 10, 12, 14 and 16 are formed of thin walled metal stock.

Inner back and front walls 18 and 20 interconnected by inner end walls 22 and 24 are spaced from the outer walls to provide space for suitable insulating material 26 interposed between the inner and outer walls to prevent the transfer of heat to the storage compartment 28 formed within the inner walls or shell and to minimize the loss of cold from the storage compartment 28. A refrigerant motor compressor unit 30 is positioned in a mechanism compartment 32 located in one end of the cabinet between the outer front wall 12 and the outer end wall 16.

A refrigerant condenser, preferably in the form of a series of interconnected tubes communicating with the outlet 34 of the motor compressor unit 30, is bonded to the outer walls 10, 12, 14 and 16 in heat conducting relation therewith to dissipate the heat of condensation of the refrigerant to the atmosphere.

The first length of the refrigerant condensing tube 36 extends up the outer end wall 16, as il-

illustrated at 38, and extends back and forth across the end wall in serpentine relation, as illustrated at 40, extending from the top toward the bottom above the mechanism compartment 32, as illustrated in the upper right hand portion of Fig. 2. From the bottom of the outer end wall 16 above the mechanism compartment 32, the first length of the condenser conduit 36 extends up to the top of the wall 16, as illustrated at 42, and is connected to a second length of the condensing tube 44 bonded in any suitable manner, as by a silver soldered joint 46 to the back panel 10. It will be understood that the back panel 10 lies adjacent to the end panel 16, the dotted line 48 merely illustrating the connection in the diagrammatic layout of Fig. 2.

The second length of the refrigerant condensing tube 44 is bonded to the back panel 10 in heat conducting relation, and extends back and forth across the back wall 10 in serpentine relation, as illustrated at 50. From the bottom of the back wall 10, the conduit 44 extends to the top of the end panel 14, as illustrated at 52, and is connected to a third length of the condensing tube 54 in any convenient manner, as by a silver soldered joint 56. The tube 54 is bonded to the end panel 14 and extends back and forth across the wall in serpentine relation, as illustrated at 58. From the bottom of the end wall 14 the tube 54 extends up, as illustrated at 60, and is connected as by a silver soldered joint 62 to a tube 64 bonded to the front wall 12.

The tube 64 is connected to a refrigerant receiver in the form of a larger diameter tube 66 bonded to the front panel 12 in serpentine relation extending toward the bottom of the panel. The large diameter tube 66 is bonded to the front panel 12 in heat conducting relation therewith and provides a space for the storage of liquefied refrigerant. The liquid refrigerant passes through a tube 68 into a strainer 70.

The refrigerant condenser formed by the tubes 36, 44, 54 and 64 bonded to the outer walls of the cabinet in thermal contact therewith absorbs heat from the compressed gaseous refrigerant from the motor compressor 30 and dissipates it to the atmosphere through the thin external metal walls of the cabinet which functions as a large heat dissipating fin. As the heat of condensation is absorbed from the gaseous refrigerant it is converted into a liquid and stored in the receiver 66.

Liquid refrigerant passing through the strainer 70 flows through a tube 72 of small diameter to meter the flow of liquid refrigerant into a refrigerant evaporator in the form of a series of interconnected tubes bonded to the outer surface of the inner walls 18, 20, 22 and 24 in heat exchange relation therewith to absorb heat from the storage compartment 28 as the liquid refrigerant expands and is reconverted to the gaseous form.

The tube 72 is preferably wrapped about and bonded in heat exchange relation to a conduit 74 extending from the remote end of the refrigerant evaporator element and extending to the inlet side 76 of the motor compressor unit 30.

The tube 72 is connected to a first length of an evaporator conduit 76 in any convenient manner, as by a silver soldered joint 80. The evaporator conduit 76 is bonded in serpentine relation to the under surface of a panel 78 positioned to overlie the mechanism compartment 32, as illustrated in the lower right hand portion of Fig. 2. The evaporator conduit 76 is connected to a sec-

ond length of evaporator conduit 82 by a suitable connection 84. The conduit 84 extends to the bottom of a side panel 86 of the mechanism compartment 32 and extends in serpentine relation up the side wall thereof, as illustrated at 88.

From the top of the panel 86 forming one of the walls of the mechanism compartment 32, the refrigerant evaporator conduit 82 is connected to another evaporator conduit 90 by a connection 92. The evaporator conduit 90 is bonded to the end wall 24 above the mechanism compartment 32 and extends toward the top of the wall in serpentine relation, as illustrated at 92. From the top of the end wall 24 the evaporator conduit 90 is connected to another evaporator conduit 94 by a connection 96. The conduit 94 extends down to the bottom of the front wall 20, as illustrated at 98, and then extends up the wall in serpentine relation thereto, as illustrated at 100.

From the top of the front wall 20 the refrigerant evaporator conduit 94 is connected to another conduit 102 by a connection 104. The conduit 102 extends down, as illustrated at 106, to the bottom of the end wall 22, and then upward thereon in serpentine relation, as illustrated at 108. From the top of the end wall 22 the evaporator conduit 102 is connected to another evaporator conduit 110 by a connector 112. The conduit 110 extends to the bottom of the back panel 18, as illustrated at 114, and is bonded thereto in heat exchange relation. The evaporator conduit 110 is connected to a refrigerant accumulator in the form of a conduit 116 of larger diameter connected to the conduit 74.

By disposing the refrigerant evaporating conduits 76, 82, 90, 94, 102 and 110 in serpentine relation relative to the side and end walls of the refrigerated compartment 28 and bonding them thereto in thermal contact, the entire inner shell defining the storage compartment 28 is employed as a refrigerant evaporating element to absorb heat from the compartment 28 as the liquid refrigerant is converted to the gaseous form.

The conduit 74 connected to the accumulator conduit 116 is bonded to the back wall 18 in thermal contact therewith, and projects through the insulation 26 to the inner surface of the outer front wall 12. As indicated above, the end of the conduit 74 is connected to the inlet side 76 of the motor compressor unit 30 as previously discussed, whereby gaseous refrigerant can be withdrawn from the accumulator of the refrigerant evaporator and be transmitted under pressure to the refrigerant condenser disposed in thermal relation on the outer panels.

The operation of this device is as follows. Gaseous refrigerant is withdrawn from the accumulator of the refrigerant evaporator 116 through the conduit 74 and is compressed by the motor compressor unit 30. The compressed gaseous refrigerant is discharged under pressure to the interconnected refrigerant condenser tubes bonded to the inner surface of the external walls of the cabinet. Heat is dissipated from the gaseous refrigerant by the external walls of the cabinet, and when a predetermined proportion of heat has been dissipated the gaseous refrigerant is converted into liquid which flows into the refrigerant receiver 66 positioned adjacent to the end of the refrigerant condenser tubes.

The liquid refrigerant passes through the strainer 70 and into the capillary liquid refrigerant metering conduit 72. The capillary tube 72 is in thermal contact with the gaseous refrigerant conducting portion 74 of the evapora-

tor. The liquid refrigerant then flows through the evaporator conduits 76 and 82 bonded to the panels 78 and 86 surrounding the mechanism compartment 32 and through the liquid refrigerant conducting tubes bonded to the interconnected end and side walls. As the liquid refrigerant expands thereby absorbing heat, it is converted to the gaseous form and flows into the accumulator 116 connected through the conduit 74 with the inlet side 76 of the motor compressor unit 30.

It will be apparent that by positioning the refrigerant condensing and evaporating elements in thermal contact with the outer and inner walls of the cabinet great efficiency of operation is insured, and the refrigerated compartment 28 is maintained as large as possible. Greater efficiency of operation thus results and a more desirable structure is attained.

It will be apparent that, if desired, contoured plates may be employed to form serpentine contoured refrigerant conducting passages for condensing gaseous refrigerant at the outer walls or shell, or to evaporate liquid refrigerant at the inner walls or shell.

The outer shell of the cabinet may be fabricated in a plurality of sections or sub-assemblies suitably secured together. For example, a central section 150 may receive prefabricated end sections 152 and 154, and the device may be completed by securing a top section 156 on the central and end sections. The top section 156 preferably has a centrally disposed framework to form a plurality of openings into the storage compartment 28. Spaced selectively operable covers 158, 160 and 162 are provided to permit access to spaced portions of the storage compartment 28.

The central section 150 is formed of front and back panels 164 and 166. As illustrated in Fig. 6, the panels 164 and 166 have rounded lower edges to define inwardly extended flanges 168 interposed between and secured to a bottom panel 170, contoured to overlie the flanges 168, as illustrated at 172, and a contoured supporting channel member 174 having a horizontally extending portion 176 secured to the flanges 168 and the bottom panel 170 in any convenient manner, as by welding. The supporting member 174 has a vertically extended portion 178, having apertures 180 extending through it to reduce the weight, and a horizontally disposed floor engaging portion 182. The panel 86 forming one side of the mechanism compartment 32 is secured to a plate 184 having flanges 186 secured to the front panel 164, as by welding.

As illustrated in Fig. 7, the front panel 164 is contoured, as illustrated at 190, to provide an inwardly extended flange 192 to support the panel 78 defining the top of the mechanism compartment 32. The panel 78 is contoured as illustrated to provide a right angle portion 194 extending parallel with the side panel 164 and a rigidifying angularly related portion 196 as illustrated in Figs. 3 and 7. The panel 78 forming the top of the mechanism compartment has an upwardly extended flange 198 adapted to align with and be welded or otherwise suitably secured to the end section 152.

The construction of the end section 152 and the manner in which it is connected to the central section 150 is illustrated in Figs. 8 to 13. As illustrated in Fig. 9, the end section 152 has a vertically extended end wall 200 rounded at the bottom to a horizontally extended section 212 aligned with the bottom panel 170. The section 212 terminates in an upwardly extended flange

214 welded or otherwise secured to an upwardly extended flange 216 of the bottom panel 170 and terminating in an angularly extended rigidifying flange 218. A supporting member 220 has a flat upper portion 222 welded to the horizontally extended section 212 of the end wall 200, and to the bottom panel 170. The ends of the supporting members 174 and 220 are angularly inclined or beveled in the vertical plane, as illustrated in Figs. 3 and 4, to insure a smooth connection of the supporting member completely around the cabinet, as illustrated in Fig. 1.

The end panel 200 of each of the end sections 152 and 154 has rounded front and back edge portions 230 and 232 adapted to align with the front and back panels of the central section 150.

The central section 150 and the end section 152 have intermediate horizontal wall sections 78 and 79, respectively, adapted to align to form the top wall of the mechanism compartment 32, as illustrated in Figs. 8 and 10. The wall 79 in the end section 152 has upwardly extended flanges 234 welded or otherwise secured to the front and back edge portions 230 and 232 of the end section 152, and is provided with a vertically extended flange 236 terminating in an angularly inclined reinforcing wall 238. The vertical flange 236 is aligned with an upwardly extended flange 240 of the wall section 78 and is secured thereto in any convenient manner, as by spot welding. The flange 240 terminates in an angularly related vertically extended rigidifying wall 242. The horizontal wall section rests on and is secured to inwardly extended flanges 244 carried by the front and back edge portions 230 and 232 over the mechanism compartment 32.

The wall section 78 rests on an inwardly extended flange 246 formed in the front and back panels 164 and 166 of the central section 150 and is secured thereto, as by spot welding.

Suitable reinforcing flanges 250 are secured to the inner walls forming the storage cabinet 28.

In the fabrication of this improved cabinet for frozen foods, the outer shell is assembled and the refrigerant condenser tubes are connected. The insulation 26 is then positioned in place and the inner shell having the refrigerant evaporator tubes secured thereto is positioned within the insulation. The top panel 156 is then placed over the assembly and secured in any desired manner, as by spot welding. The manually actuated lids 158, 160 and 162 are placed on the framework of the top panel.

By placing the condenser tube on the outer walls and utilizing such walls for the dissipation of heat, there will be sufficient heat conducted to the top panel 156 to prevent sweating about the entrance to the compartment 28.

Although a preferred form of the invention has been illustrated and described in detail, it will be apparent to those skilled in the art that various modifications may be made without departing from the spirit of the invention or from the scope of the appended claims.

I claim:

1. A refrigerated compartment comprising a central section formed of thin walled metal sheets forming bottom and side walls having inwardly extended flanges, one end of the central section having interconnected vertical and horizontal walls extending from front to back to define a portion of a mechanism compartment and having angularly related flanges secured together and to the side and bottom walls of the central section, spaced end sections formed of thin walled

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sheets having rounded side walls and substantially flat bottom wall portions adapted to align with and be secured to the ends of the central section, one of the end sections having a horizontally extended wall adapted to align with the horizontal wall extending from front to back to complete the mechanism compartment and having angularly related flanges secured to the end section and adapted to be secured to an angularly related flange of the central section, a supporting flange positioned beneath and secured to the bottom of the central and end sections, an apertured cover plate having rounded edge portions mounted on and secured to the top of the central and end sections, and manually operable closures for the apertured cover.

2. In a refrigerator cabinet, a central section formed of thin walled metal sheets forming bottom and side walls having inwardly extending flanges, one end of said central section having a side wall recess, a vertical plate member and a horizontal plate member defining said recess and having flanges secured to the flange of said bottom and side walls, spaced end sections formed of thin walled sheets having side walls and bottom wall portions aligning respectively with and secured to the ends of said central section bottom and side walls, one of said end sections having a horizontally extended wall member aligning with said first horizontal wall to form the top wall of a refrigerating apparatus compartment and having flanges secured to said end sections and to said central section, a supporting flange positioned beneath and secured to the bottom of said central and end sections, an apertured cover plate mounted on the top edges of said central and end sections, and closure members closing the apertures in said plate.

3. In a refrigerator cabinet construction, a

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central casing section of U-shape cross section forming bottom and opposite side walls having inwardly extended flanges, one end of said central section having interconnected vertical and horizontal walls extending between said side walls to define a portion of a mechanism compartment and having flanges secured together and to the side and bottom walls of said central section, spaced end sections having side and bottom wall portions aligned with and secured to opposite ends of said central section, one of said end sections having a horizontally extending wall adapted to align with said first named horizontal wall to complete the mechanism compartment and having flanges secured to said one end section and adapted to be secured to a flange of said central section, a supporting flange secured to the bottom wall of said central and end sections, an apertured cover mounted on and secured to the top of said central and end sections, and closure members for the apertures in said cover.

LAWRENCE A. PHILIPP.

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