Feb. 23, 1954 W. G. SPIEGELHALTER 2,669,853

REFRIGERATED CABINET HAVING MOVABLE CONDENSER

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Fig. 1.

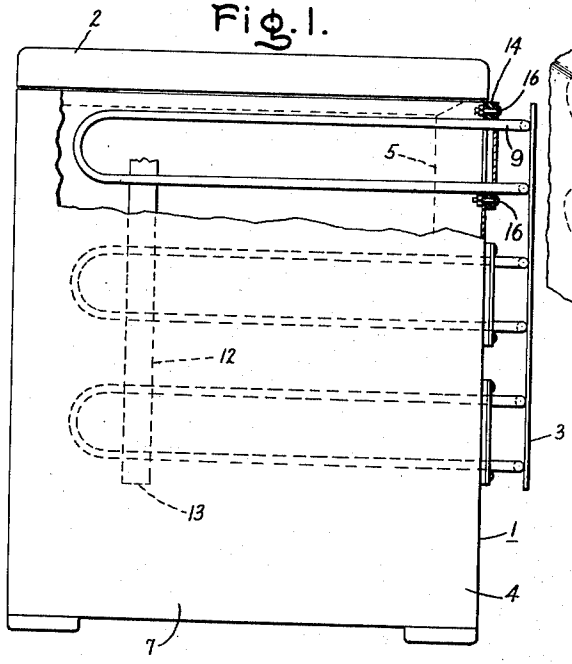


Fig. 2.

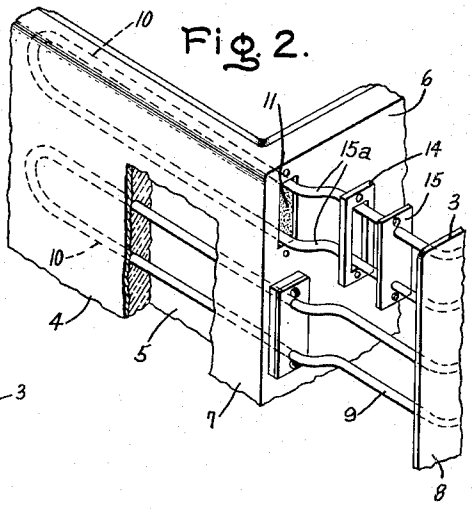


Fig. 3.

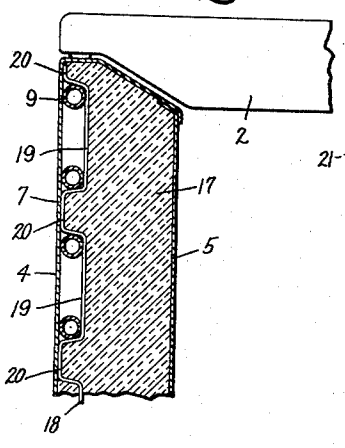
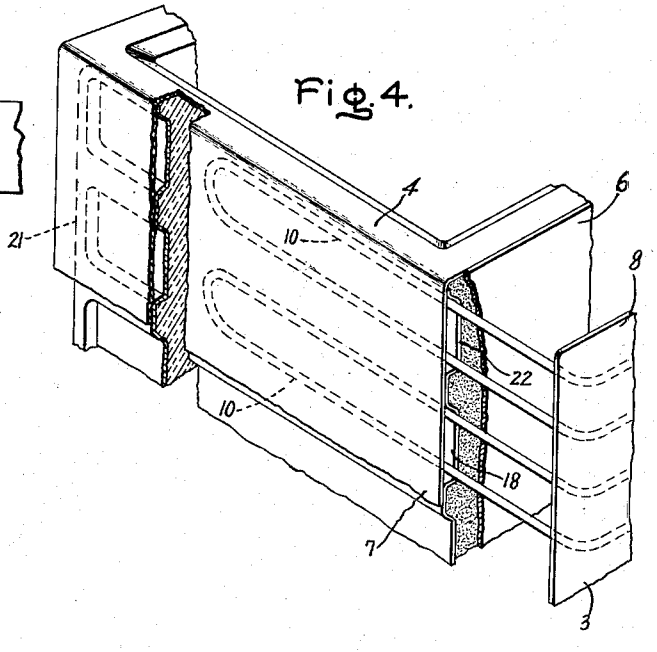


Fig. 4.



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REFRIGERATED CABINET HAVING MOVABLE CONDENSER

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6 Claims. (Cl. 62—117.2)

1

My invention relates to refrigerated cabinets, and more particularly to condenser arrangements for such cabinets.

In connection with refrigerated cabinets, it is common practice to provide a so-called natural draft condenser, i. e., a condenser cooled by room air flowing by convection over the condenser surface. These condensers may consist of a sheet of metal having refrigerant-conducting tubing arranged thereon, usually in serpentine form. The condenser is usually mounted on the rear wall of the cabinet in spaced relation to this rear wall. In many household refrigerators, such condensers are of quite adequate capacity. However, particularly in the case of food freezers, where a much greater load is imposed relative to the size of the cabinet involved because of the low temperature maintained within the refrigerated cabinet, the space available at the rear wall of the cabinet may be insufficient to accommodate a condenser of the required capacity. By my invention, a condenser construction is provided which includes additional heat transfer surface making the condenser adequate even for refrigerated cabinets, such as food freezers, operating at very low temperatures. In addition by my invention the condenser is easily and conveniently mounted on the cabinet. Moreover, the condenser may be arranged so that it is maintained in spaced relationship to the rear wall during normal operation and yet can be moved close to the rear wall if necessary to decrease the over-all depth of the refrigerated cabinet so as to permit movement of the cabinet through narrow doorways.

Accordingly, it is an object of my invention to provide a refrigerated cabinet including an improved condenser construction and mounting arrangement.

It is another object of my invention to provide a condenser arrangement for refrigerated cabinets which includes a large heat dissipating area.

It is a further object of my invention to provide a refrigerated cabinet including an improved arrangement for adjustably mounting a condenser on a refrigerated cabinet.

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 part of this specification.

In carrying out the objects of my invention, a condenser is provided which includes a flat plate or sheet having a continuous refrigerant-conducting conduit arranged in serpentine form thereon. This continuous conduit includes forwardly extending sections which are received within the space between the inner and outer walls of the refrigerated cabinet, and are arranged in heat exchange contact with the side portions of the outer wall. In this way, heat is dissipated from the condenser not only to the air flowing by convection over the flat sheet and the tubing secured thereto, but also to the side portions of the outer wall of the refrigerated cabinet. The forwardly extending sections of the condenser may be mounted on the side portions of the outer wall in such a manner as to permit the flat plate and the tubing secured thereto to be moved adjacent the rear wall of the refrigerated cabinet when it is desired to reduce the depth of the cabinet.

2

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 broken away, of a refrigerated cabinet incorporating an embodiment of my invention.

Fig. 2 is an exploded view of a portion of the cabinet shown in Fig. 1.

Fig. 3 is a sectional elevation view of a portion of a refrigerated cabinet illustrating a modified form of my invention.

Fig. 4 is an exploded view of a portion of the refrigerated cabinet incorporating this modified form of my invention.

Referring to Fig. 1, there is shown a refrigerated cabinet 1, which, by way of example, may be a chest-type food freezer. Access to the interior of the refrigerated cabinet is provided by an opening at the top, and this excess opening is closed by a hinged lid 2. The cabinet is cooled by a refrigerating system which includes a refrigerating unit (not shown), a condenser 3, and an evaporator (not shown), which may be disposed within the food storage compartment or secured to the liner thereof.

The refrigerated cabinet includes an outer wall 4, and a spaced inner wall 5, the inner wall defining a food storage compartment. The outer wall of the refrigerated cabinet includes a rear portion 6 and two side portions, one of which is shown at 7.

The condenser 3 includes a flat sheet or plate 8 of metal and a continuous refrigerant-conducting conduit or tubing 9, which is secured to the sheet 8 in any suitable manner, for example, by brazing. The general arrangement of a continuous refrigerant-conducting conduit brazed to a flat sheet is, of course, not new, being a conven-

tional construction now employed in condensers for many refrigerators. However, I have provided an additional feature which gives a substantially increased capacity for the condenser and enables the employment of a so-called natural draft condenser even where the space available at the rear wall of the cabinet is insufficient to accommodate the condenser of the size needed to provide the necessary capacity. Thus, in addition to providing the continuous refrigerant-conducting conduit on the surface of the sheet 8, I have arranged sections or loops 10 of this conduit extending forwardly from the sides or ends of the sheet 8. Each of these loops 10 is received in a corresponding opening in the rear portion 6 of the outer wall, one such opening being shown at 11. While these sections or loops have been illustrated in the drawing only at one end of the sheet 8, it will be understood that they can, and usually would be, employed at both ends thereof. In the form illustrated, one such opennig 11 is provided for receiving each of the forwardly extending loops or sections 10, but it will be understood that, if desired, a single elongated opening extending from the top to the bottom of the condenser could be provided at each end of the rear portion 6.

As mentioned above, the sections or loops 10 are received within the openings 11, and they extend into the space between the inner and outer walls adjacent the side portions 7 of the outer wall 4. The loops 10 are positioned in heat exchange contact with the inner surface of the side portions 7 of the outer wall 4. They may be maintained in such heat exchange contact in a number of ways, for example, by the force exerted by the compressible heat-insulating material usually employed between the inner and outer walls, by a strap 12 which is secured at its ends 13 to the inner surface of the outer wall, for example by welding, and presses the tubing firmly against the outer wall, etc.

In order to prevent the entrance of moisture into the insulation space through the openings 11, these openings are sealed by gaskets 14 of compressible material, such as rubber, and plates 15 which are adapted to be pressed against gaskets 14. Plates 15 are forced against the gaskets 14 by screws 16, which engage nuts mounted internally of the rear portion 6 of the outer wall. The plates 15 are preferably secured to the sections 10 of the tubing, the tubing passing through openings in these plates and being secured thereto in any suitable manner, as by brazing or welding, to close these openings. While individual gaskets and plates have been shown for effecting sealing of the openings 11, a single gasket and plate may be employed, if desired, for sealing all of the openings at each end of the rear portion of the outer wall. Since the openings 11 must be a small distance from the edge of the rear wall in order to provide a sealing surface for the gaskets 14, and since the loops 10 must fit closely adjacent the inner surface of the outer wall 4 for good heat exchange, the loops 10 are bent as indicated at 15a. The conduit is sufficiently resilient that the loops 10 can be moved inwardly to the limited extent necessary to permit entry of the ends into the openings 11 and the loops will spring back against the outer wall 4 when the bends 15a have passed inwardly through the openings 11.

It can be seen that by the arrangement described, the provision of the additional forwardly extending loops or sections of the continuous refrigerant-conducting conduit in heat exchange contact with the side portions of the outer wall provide a substantially increased capacity for the condenser. This enables a natural draft condenser to be employed with refrigerated cabinets where the capacity is greater than could be provided by the size condenser which could be installed in the usual location at the back of the cabinet. I am aware the condensers have heretofore been employed in which the refrigerant-conducting tubing is positioned in contact with the outer wall, but I have disclosed herein a unitary structure which includes a portion disposed in spaced relationship to the rear walls so as to take advantage of the cooling effect of the convection air currents where available, and in addition, a portion engaging the side portion of the outer wall to obtain the additional heat dissipating capacity. In addition, the arrangement disclosed makes possible a simple mounting of the condenser in the desired location. The completed condenser is assembled on the cabinet by merely inserting the forwardly extending loops 10 into the corresponding openings in the rear portion of the outer wall of the cabinet, and then screwing the plate or plates 15 into position.

A modified form of my invention is shown in Figs. 3 and 4. The same numerals have been employed to designate corresponding parts in Figs. 1 and 2 and in Figs. 3 and 4. The refrigerated cabinet includes an outer wall 4 and an inner wall 5, the space therebetween being filled with suitable heat insulating material 17. In the form shown in Figs. 3 and 4, a corrugated sheet is provided adjacent the inner surface of each of the side portions 7 of the outer wall, one such sheet being shown at 18. Each corrugated sheet 18 includes a plurality of parallel sections 19 of channel section extending from the rear toward the front of the refrigerated cabinet. The sheet 18 is secured to the outer wall 4 in any suitable manner, as by welding along a plurality of parallel strip portions 20 thereof, disposed in contact with the inner surface of the outer wall. The ends of the channel sections 19 are closed at the forward portion of the refrigerator cabinet by forming the sheet 18 to engage the outer wall along a vertical strip 21 at this region. The channel sections 19 are, on the other hand, open at the rear ends thereof for receiving the forwardly extending loops or sections 10 of the condenser 3. By the construction shown in Figs. 3 and 4, the necessity for providing the sealing gaskets 14 and the plates 15 is avoided, since the channel sections 19 provide receiving openings for the loops 10 which are closed or sealed from the insulation space between the inner and outer walls. Rear portion 6 of the outer wall is sealed to the rear edge 22 of the corrugated sheet 18 in any suitable manner, as by brazing or welding, so as to block access of moisture into the insulation space.

The condenser 3 is assembled or mounted on the refrigerator cabinet in the same general manner as the condenser shown in the form illustrated in Figs. 1 and 2, with the exception, as mentioned previously, that the sealing gaskets 14 and plates 15 are omitted. In addition, the channel sections 19 are made of such size that the conduit 9 fits tightly therein and is pressed by the channel sections firmly against the outer wall 4.

The form of the invention illustrated in Figs. 3 and 4 also lends itself readily to the collapsing of the condenser closely adjacent to the rear

portion 6 of the outer wall, when it is desired to reduce the over-all depth of the refrigerated cabinet, for example, for moving the cabinet through relatively narrow doorways. Since the conduit 9 is frictionally held between the channel sections 19 and the side portions 7 of the outer wall, the condenser 3 is merely pushed rearwardly until the desired spacing for normal operation between the rear portion 6 of the outer wall and the sheet 8 of the condenser is achieved. This may be, for example, 3 to 4 inches. If, then, it is desired to reduce the over-all depth of the refrigerated cabinet, it is only necessary to push the condenser forwardly an additional amount until the conduit 9 secured to the plate 8 contacts the rear portion of the outer wall. After the refrigerated cabinet has been set in place, the condenser can easily be moved rearwardly to give the desired spacing between the sheet 8 and the rear portion 6 of the outer wall.

While I have shown and described specific embodiments of my invention, I do not desire my invention to be limited to the particular construction shown and described, and I intend by the appended 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 refrigerated cabinet including an outer wall, an inner wall spaced from said outer wall, said outer wall including a rear portion and two side portions, a condenser spaced from said rear portion of said outer wall, said condenser comprising a flat sheet and a continuous refrigerant-conducting conduit arranged in serpentine form and secured to said sheet, said conduit including sections extending forwardly from said sheet at each end thereof, each of said sections being disposed in heat exchange contact with a corresponding one of said side portions of said outer wall.

2. A refrigerated cabinet including an outer wall, an inner wall spaced from said outer wall, said outer wall including a rear portion and two side portions, a condenser spaced from said rear portion of said outer wall, said condenser comprising a flat sheet and a continuous refrigerant-conducting conduit arranged in serpentine form and secured to said sheet, said conduit including sections extending forwardly from said sheet at each end thereof, each of said sections being disposed in heat exchange contact with the inner surface of a corresponding one of said side portions of said outer wall.

3. A refrigerated cabinet including an outer wall, an inner wall spaced from said outer wall, said outer wall including a rear portion and two side portions, a condenser normally spaced from said rear portion of said outer wall, said condenser comprising a flat sheet and a continuous refrigerant-conducting conduit arranged in serpentine form and secured to said sheet, said conduit including sections extending forwardly from said sheet at each end thereof, said rear portion of said outer wall having at least one opening therein adjacent each corresponding side portion of said outer wall for receiving said sections, each of said sections being disposed in the space between said inner and outer walls and in heat exchange contact with a corresponding one of said side portions of said outer wall, and means for sealing said openings.

4. A refrigerated cabinet including an outer wall, an inner wall spaced from said outer wall, said outer wall including a rear portion and two side portions, a condenser normally spaced from said rear portion of said outer wall, said condenser comprising a flat sheet and a continuous refrigerant-conducting conduit arranged in serpentine form and secured to said sheet, said conduit including sections extending forwardly from said sheet at each end thereof, said rear portion of said outer wall having at least one opening therein adjacent each corresponding side portion of said outer wall for receiving said sections, each of said sections being disposed in the space between said inner and outer walls and in heat exchange contact with a corresponding one of said side portions of said outer wall, and means secured to said sections for sealing said openings.

5. A refrigerated cabinet including an outer wall, an inner wall spaced from said outer wall, said outer wall including a rear portion and two side portions, a condenser normally spaced from said rear portion of said outer wall, said condenser comprising a flat sheet and a continuous refrigerant-conducting conduit arranged in serpentine form and secured to said sheet, a second sheet secured to the inner surface of each of said side portions of said outer wall, each of said second sheets having horizontal channels therein providing horizontal recesses between each of said second sheets and the corresponding side portions of said outer wall, said conduit including a plurality of forwardly extending loop portions, each of said loop portions being slidably and frictionally received within a corresponding one of said recesses whereby said condenser may be moved between a normal position wherein said condenser sheet is spaced from said rear portion of said outer wall and a second position wherein said condenser sheet is positioned adjacent said rear portion of said outer wall.

6. A refrigerated cabinet including an outer wall, an inner wall spaced from said outer wall, said outer wall including a rear portion and two side portions, a condenser normally spaced from said rear portion of said outer wall, said condenser comprising a flat sheet and a continuous refrigerant-conducting conduit arranged in serpentine form and secured to said sheet, said conduit including sections extending forwardly from said sheet at each end thereof, and means mounting each of said sections in slidable heat exchange contact with a corresponding one of said side portions of said outer wall, said slidable mounting means adapted to afford positioning of said flat sheet alternatively adjacent said rear portion of said outer wall or spaced therefrom.

WILLIAM G. SPIEGELHALTER.

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