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UNDER COUNTER REFRIGERATOR

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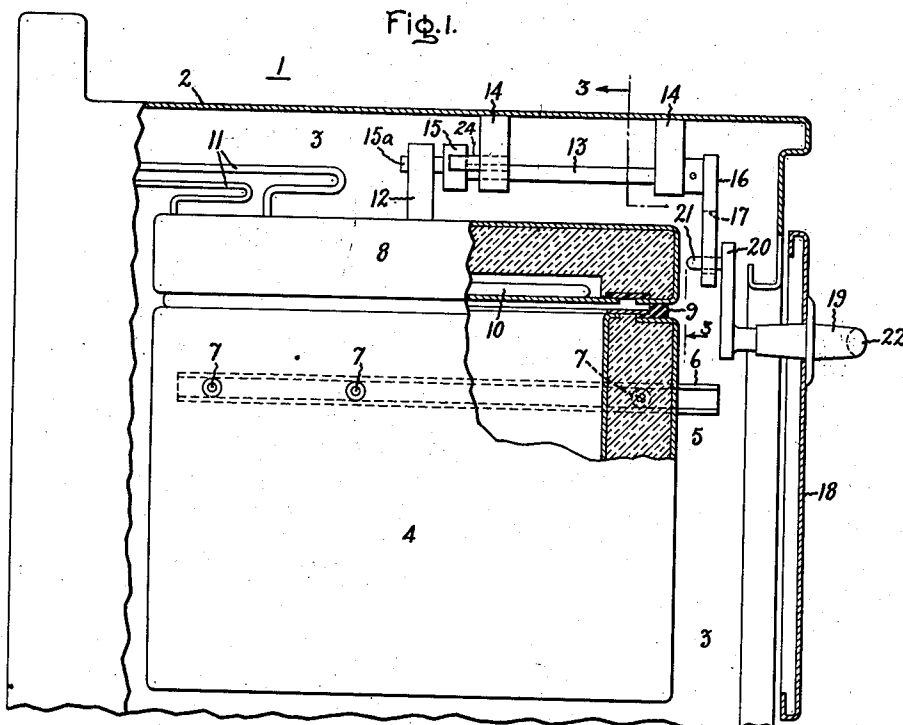


Fig. 2.

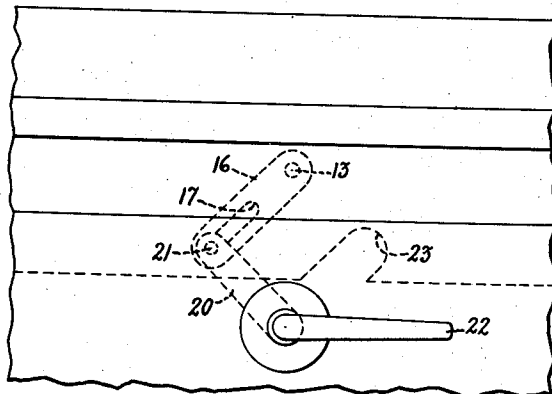


Fig. 3.

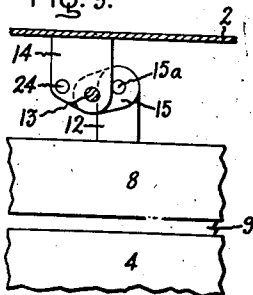
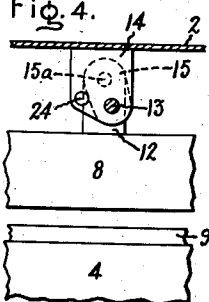


Fig. 4.



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UNDER COUNTER REFRIGERATOR

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7 Claims. (Cl. 62—89)

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This invention relates to refrigeration apparatus and has particular reference to refrigerator cabinet structures adapted for under counter installation.

Many refrigeration applications, both in the home and in commercial establishments, suggest the use of a rather low structure for the refrigerator cabinet. In such applications the top surface of the refrigerator cabinet very often serves as a counter area or work surface. If the storage compartment of such a refrigerator cabinet is constructed along conventional lines, however, access to the interior portions of the cabinet is rather difficult. Therefore, the expedient of forming the storage compartment of such refrigerators in the form of a drawer has been resorted to. In the usual case this drawer type storage compartment is mounted upon rollers or some similar supporting means so that the drawer may be moved laterally from the interior portions of the cabinet.

While these drawer type refrigerators offer the advantage of having the storage compartment easily accessible, there are some objections thereto. One such objection is that it is difficult to tightly seal the drawer space against ambient heat. Another difficulty encountered in this type of refrigerator is that of efficiently cooling the storage space. The coils of a cooling element can be secured to the walls of the drawer, but it then becomes necessary to either mount the entire refrigeration unit in the drawer itself or utilize a relatively long length of flexible tubing to convey the refrigerant to the cooling elements. An alternative to this arrangement is to mount the cooling element upon the other portions of the cabinet structure and thus avoid the use of long lengths of flexible tubing. This latter arrangement, however, is subject to the disadvantage that the heat exchange relationship between the drawer and the cooling element is not as efficient as in the case where there is intimate thermal contact between the cooling elements and the drawer or storage compartment. In accordance with this invention I overcome these disadvantages by providing the drawer of a refrigerator cabinet of this type with a heat insulating lid which is positioned above the drawer and mounted within the cabinet so as to be movable into sealing engagement with the top portions of the drawer. Mounted within this lid are the refrigerant coils or cooling elements, and, as a result, intimate heat exchange relationship exists between the storage space of the drawer and these cooling elements.

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Accordingly, it is an object of this invention to provide a refrigerator cabinet with a drawer type storage compartment including an improved sealing arrangement for the drawer.

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

For a better understanding of this invention reference may be had to the accompanying drawings in which Fig. 1 is a side elevation, partly in section, showing the position of the drawer and the associated lid and cooling elements within the cabinet of the refrigerator; Fig. 2 is a front view of a portion of the cabinet showing the handle mechanism which is operated to move the lid into and out of the sealing engagement with the drawer; Fig. 3 is a view taken along the line 3—3 in Fig. 1; and Fig. 4 is a view similar to Fig. 3 showing the parts in the raised position of the lid.

Referring more particularly to Fig. 1, there is shown a refrigerator cabinet 1 which is defined by an outer wall or casing 2. Although the general configuration of the cabinet structure may take on a variety of forms and sizes, there is shown, by way of example, the cabinet 1 as being of a rather low structure so that the portion of the outer wall or casing 2 which forms the top of the cabinet may serve as a work surface or counter area. The outer wall or casing 2 defines an inner space 3 within which I have mounted the food storage compartment. This compartment is in the form of a drawer 4 which is defined by heat insulating bottom and side walls as indicated at 5. The drawer 4 is mounted within the space 3 so that it may be moved laterally from the space and thus render the inner portion of the drawer accessible. This mounting includes a channel or trackway 6 which is fixed to the inner surface of the outer wall portion 2. Upon the sides of the drawer 4 I have positioned a plurality of rollers 7. When the drawer 4 is in position within the cabinet space 3 the rollers 7 cooperate with the guide or trackway 6 to support the drawer. It can be seen that the cooperating rollers 7 and trackway 6 permit the drawer 4 to be moved laterally from its position within the space 3 to a position outside so as to afford access to the drawer space. Although the cooperating channel or trackway has been illustrated on one side of the drawer 4, it is to be understood that the arrangement including roller-

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ers and channel is provided upon each of two opposite sides of the drawer so as to afford a balanced support.

The drawer 4 is to serve as the food storage compartment of the refrigerator. It is therefore desirable to provide for effectively sealing the interior portions of the drawer against heat leakage. To this end, a heat insulating lid 8 is positioned above the drawer and engages a gasket 9 secured to the upper face of the drawer 4. As will be explained below, this lid 8 is mounted so as to be moved in a vertical direction into and out of sealing engagement with the top portions of the drawer 4. As shown in Fig. 1, the lid 8 is in its lower or sealing position, and the gasket 9 is compressed between the top edges of the drawer walls 5 and the lower surface of the lid 8. With the lid in this position the interior portion of the storage compartment or drawer 4 is effectively sealed against heat leakage.

Mounted within the heat insulating lid 8 is a cooling element 10 which may be in any of the conventional forms for such cooling elements. In the usual case the cooling element is in the form of serpentine tubing which is adapted to convey the refrigerant fluid. Refrigerant is supplied to the cooling element 10 from any conventional refrigerating apparatus (not shown), and heat is thereby extracted from the storage compartment or drawer 4. Communication between the cooling element 10 and the other elements of the refrigerating apparatus is afforded by flexible tubing 11 adapted to carry the fluid refrigerant. By mounting the cooling element 10 directly in the lid 8 intimate heat exchange relationship between the cooling element and the drawer or storage compartment is insured.

As indicated above, the heat insulating lid 8 is mounted so that it may be moved in a vertical direction either into or out of sealing engagement with the drawer 4. I have provided a bearing block or member 12 upon the upper surface of the lid 8. An operating shaft or crankshaft 13 is mounted upon the outer wall 2 by means of the bearings 14, and a crank arm 15 is secured at one end of this operating shaft. A pin 15a is positioned upon the crank arm 15 and cooperates with the bearing block 12 to support the heat insulating lid 8. Upon the opposite end of the operating shaft 13 we have positioned another crank arm 16 having a longitudinal slot 17. The drawer 4 is provided with a front panel 18, and a rotatable shaft 19 is journaled in this panel. At the inner end of the shaft 19 we have secured an operating lever 20 which is provided with a pin 21 adapted to engage the longitudinal slot 17 of crank arm 16. A handle or manipulating lever 22 is secured to the outer end of the shaft 19. The manipulating lever 22 is adapted both for rotating the shaft 19 to actuated the operating lever 20 and for opening and closing the drawer. To provide for passage of the operating lever 20 when the drawer 4 is pulled out, a slot 23 is provided in the front portion of the outer wall 2.

Figs. 2, 3 and 4 illustrate the manner in which the lid 8 is raised to afford opening movement of a drawer 4. Normally, the drawer 4 is positioned within the cabinet space 3 and the lid 8 is in sealing engagement with the gasket 9 on the upper surface of the drawer. When it is desired to pull the drawer outwardly from the cabinet, the handle or manipulating lever 22 is turned clockwise through 90 degrees to a vertical position. This causes the operating lever 20 to move through an angle of 90 degrees thereby causing corre-

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sponding rotation of the operating shaft 13 in the opposite direction. As the operating shaft 13 is rotated, the crank arm 15 is also rotated, thereby effecting an upward movement of the lid 8 through the engagement between the pin 15a and the bearing block 12 located upon the upper surface of the lid. With the lid in this upper position, the seal between the lid and the walls 5 of the drawer is broken, and the drawer may then be moved laterally on the rollers 7 to its position projecting from the cabinet space 3. The lid, together with the parts connected thereto, is illustrated in its closed position in Fig. 3 and in its open position in Fig. 4.

As the drawer is moved to the open position, the pin 21 moves out of engagement with the longitudinal slot 17 in the crank arm 16. The parts, however, remain in their respective positions while the drawer is in its open position since the crank arm 15 is arranged to move over center during the aforementioned movement of the handle 22 and, in the open position of the lid, the crank arm 15 engages a stop 24 which is formed integral with or secured to the rear bearing 14. This engagement between the crank arm 15 and the stop 24 limits the movement of the operating shaft 13, and the weight of the lid holds the crank arm 15 into engagement with stop 24. Because of the aforementioned arrangement including the stop 24, the crank arm 16 remains in the position to which it is moved by the operation of handle 22 to the drawer-opening position. Therefore, when the drawer is returned to its closed position within the storage space 3, the pin 21 is again received within the slot 17 in the crank arm 16. The lid 8 is then lowered into sealing engagement with the drawer by rotating the handle 22 back to its horizontal position.

It can thus be seen that a refrigerator cabinet with a drawer type storage compartment is provided in which a heat insulating lid effectively seals the compartment against heat leakage when the drawer or compartment is in its normal position within the cabinet. We have further provided an arrangement whereby efficient heat transfer is accomplished between the cooling element and the storage compartment by mounting the cooling element in the lid of the compartment or drawer. Furthermore, an effective mechanism has been provided for moving the lid into and out of sealing engagement with the drawer or storage compartment.

While one specific embodiment of this invention in which a single drawer is utilized in the cabinet has been shown and described, it is obvious that this invention could be applied to refrigerator cabinets utilizing a plurality of drawer type storage compartments. As a specific embodiment of this invention there has also been shown a refrigerator cabinet of the type in which the top portion may be utilized as a work surface or counter area. It is obvious, however, that other cabinet configurations and forms may be employed without departing from the spirit of this invention. It is not desired, therefore, that this invention be limited to the construction illustrated and described, and it is intended by the appended claims to cover all modifications within the spirit and scope of this invention.

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

1. A cabinet for refrigerators and the like comprising an outer wall defining an inner space, at least one drawer movably mounted within said inner space and adapted to be moved between a first position within said inner space and a sec-

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ond position projecting from said inner space, said drawer including heat insulating side and bottom walls defining a storage compartment, a heat insulating lid normally maintained in sealing engagement with said drawer when said drawer is in said first position, means for moving said lid out of sealing engagement with said drawer so as to afford movement of said drawer from said first position to said second position, said means including a bearing member mounted upon said lid, and a crank arm including a pin received in said bearing member to support said lid above said drawer, said pin being positionable over center of said crank arm for maintaining said lid out of sealing engagement with said drawer.

2. A cabinet for refrigerators and the like comprising an outer wall defining an inner space, at least one drawer movably mounted within said inner space and adapted to be moved between a first position within said inner space and a second position projecting from said inner space, said drawer including heat insulating side and bottom walls defining a storage compartment, a heat insulating lid normally maintained in sealing engagement with said drawer when said drawer is in said first position, means for moving said lid out of sealing engagement with said drawer so as to afford movement of said drawer from said first position to said second position, said means including a bearing member mounted upon said lid, a crank arm including a pin received in said bearing member to support said lid above said drawer, said pin being positionable over center of said crank arm for maintaining said lid out of sealing engagement with said drawer, and actuating means for operating said crank arm and pin, said actuating means including an operating lever movable with said drawer.

3. A cabinet for refrigerators and the like comprising an outer wall defining an inner space, at least one drawer movably mounted within said inner space and adapted to be moved between a first position within said inner space and a second position projecting from said inner space, said drawer including heat insulating side and bottom walls defining a storage compartment, a heat insulating lid normally maintained in sealing engagement with said drawer when said drawer is in said first position, means for moving said lid out of sealing engagement with said drawer so as to afford movement of said drawer from said first position to said second position, said means including a bearing member mounted upon said lid, a crank arm including a pin received in said bearing member to support said lid above said drawer, said pin being positionable over center of said crank arm for maintaining said lid out of sealing engagement with said drawer, and actuating means cooperating with said crank arm, said actuating means including an operating shaft secured to said crank arm and rotatably supported from said outer wall, said actuating means further including an operating lever movable with said drawer.

4. A cabinet for refrigerators and the like comprising an outer wall defining an inner space, at least one drawer movably mounted within said inner space and adapted to move between a first position within said inner space and a second position projecting from said inner space, said drawer including heat insulating side and bottom walls defining a storage compartment, a heat insulating lid normally maintained in sealing engagement with said drawer when said drawer is in said first position, means for mov-

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ing said lid out of sealing engagement with said drawer so as to afford movement of said drawer from said first position to said second position, said means including a bearing member mounted upon said lid, a crank arm including a pin received within said bearing member to support said lid above said drawer, actuating means for operating said crank arm and pin, said actuating means including an operating shaft secured at one end to said crank arm and rotatably supported from said outer wall, a second crank arm secured at the other end of said shaft, and a manually operable lever cooperating with said second crank arm to rotate said shaft and thereby operate said first mentioned crank arm and pin.

5. A cabinet for refrigerators and the like comprising an outer wall defining an inner space, at least one drawer movably mounted within said inner space and adapted to be moved between a first position within said inner space and a second position projecting from said inner space, said drawer including heat insulating side and bottom walls defining a storage compartment, a heat insulating lid normally maintained in sealing engagement with said drawer when said drawer is in said first position, a cooling element mounted in said lid for extracting heat from said drawer, and means for moving said lid out of sealing engagement with said drawer to afford movement of said drawer from said first position to said second position, said means including a rotatable operating shaft, an operating lever movable with said drawer, and a disengageable mechanical linkage between said operating shaft and said operating lever.

6. A cabinet for refrigerators and the like comprising an outer wall defining an inner space, at least one drawer movably secured within said inner space and adapted to be moved between a first position within said inner space and a second position projecting from said inner space, said drawer including heat insulating side and bottom walls defining a storage compartment, a heat insulating lid normally maintained in sealing engagement with said drawer when said drawer is in said first position, a cooling element mounted in said lid for extracting heat from said drawer, means for moving said lid out of sealing engagement with said drawer so as to afford movement of said drawer from said first position to said second position, said means including a crankshaft rotatably supported from said outer wall, a first crank arm at one end of said shaft, a second crank arm at the other end of said shaft, a bearing member positioned on said lid, said first crank arm including a portion received within said bearing member to support said lid above said drawer, and a lever engaging said second crank arm whereby operation of said lever causes rotation of said shaft to move said lid.

7. A cabinet for refrigerators and the like comprising an outer wall defining an inner space, at least one drawer movably mounted within said inner space and adapted to be moved between a first position within said inner space and a second position projecting from said inner space, said drawer including heat insulating side and bottom walls defining a storage compartment, a heating insulating lid normally maintained in sealing engagement with said drawer when said drawer is in said first position, a cooling element mounted in said lid for extracting heat from said

drawer, and means for moving said lid out of sealing engagement with said drawer so as to afford movement of said drawer from said first position to said second position, said means including a rotatable operating shaft, an operating lever movable with said drawer, a mechanical linkage connecting said shaft and said lever when said drawer is in said first position, said linkage being disengaged upon movement of said drawer from said first position to said second position, and a manipulatable lever movable with said drawer, said manipulatable lever being effective for both actuating said operating lever

and moving said drawer between said first and second positions.

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