Aug. 31, 1937. L. H. SCURLOCK 2,091,292

REFRIGERATOR

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Fig. 1

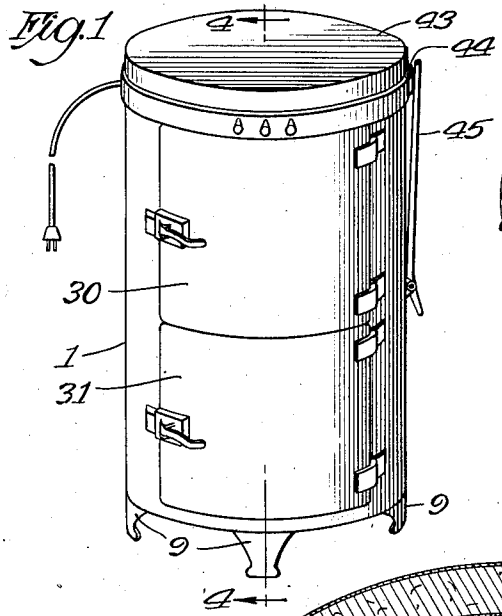


Fig. 2

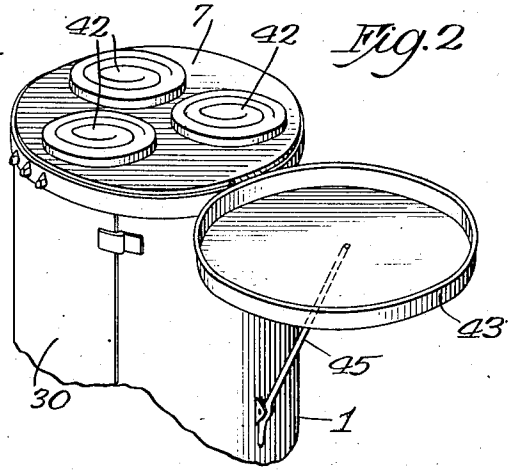
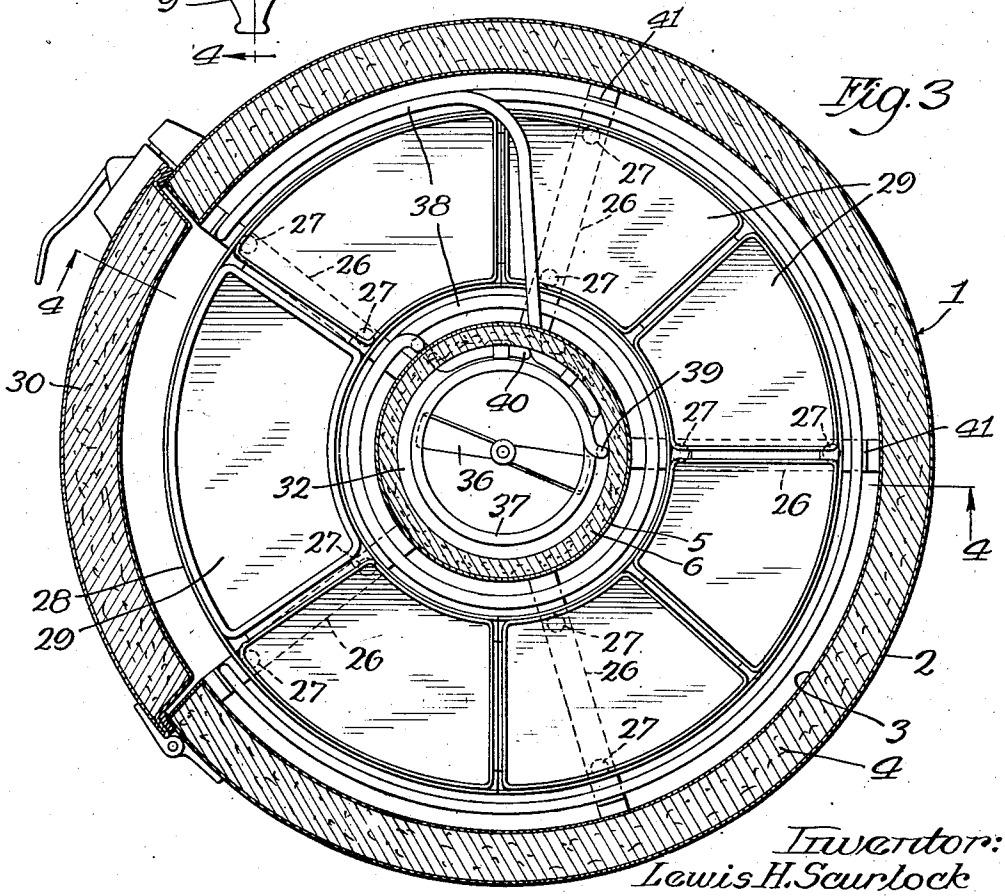


Fig. 3



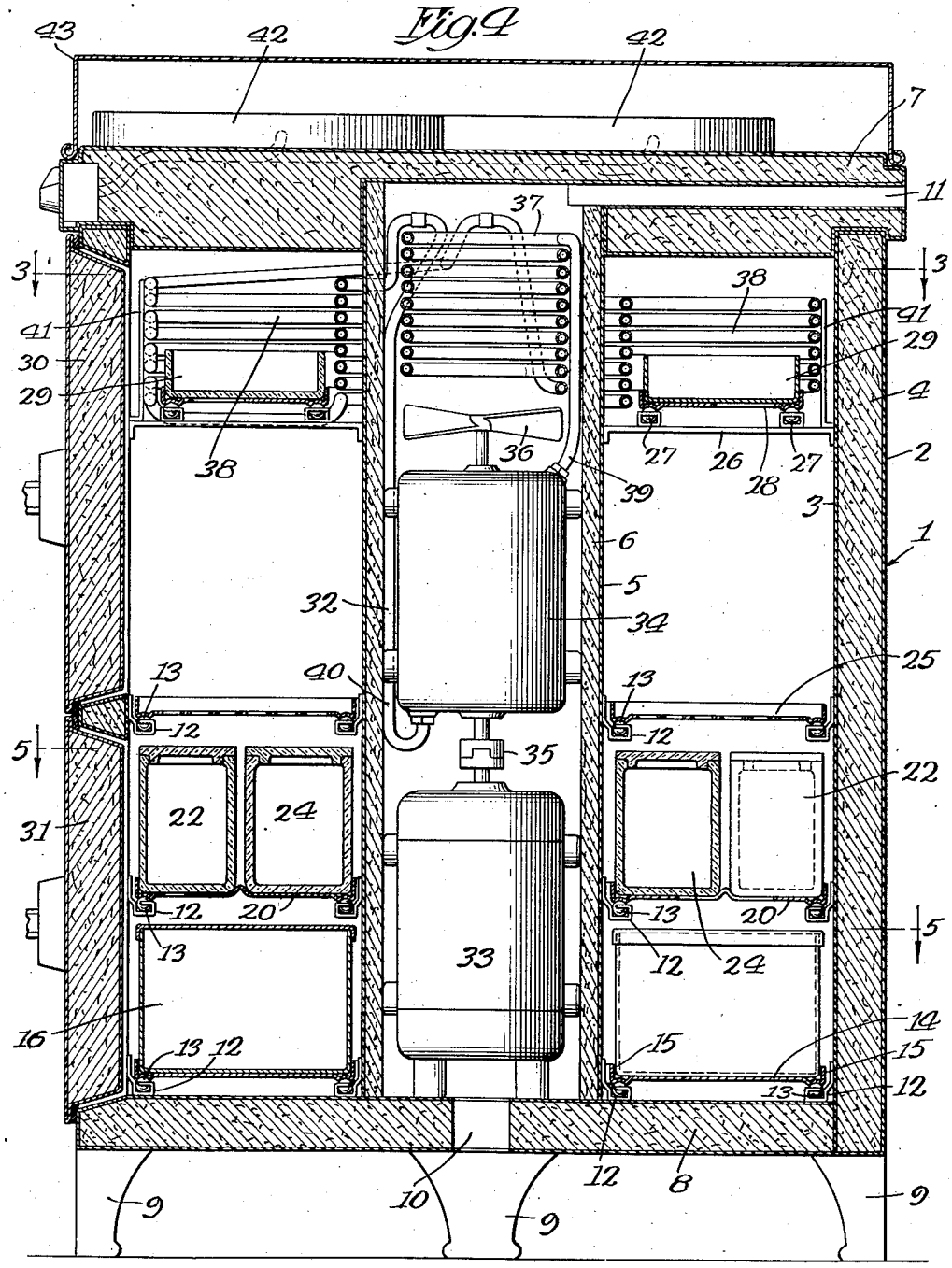
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Fig. 4



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Fig. 5

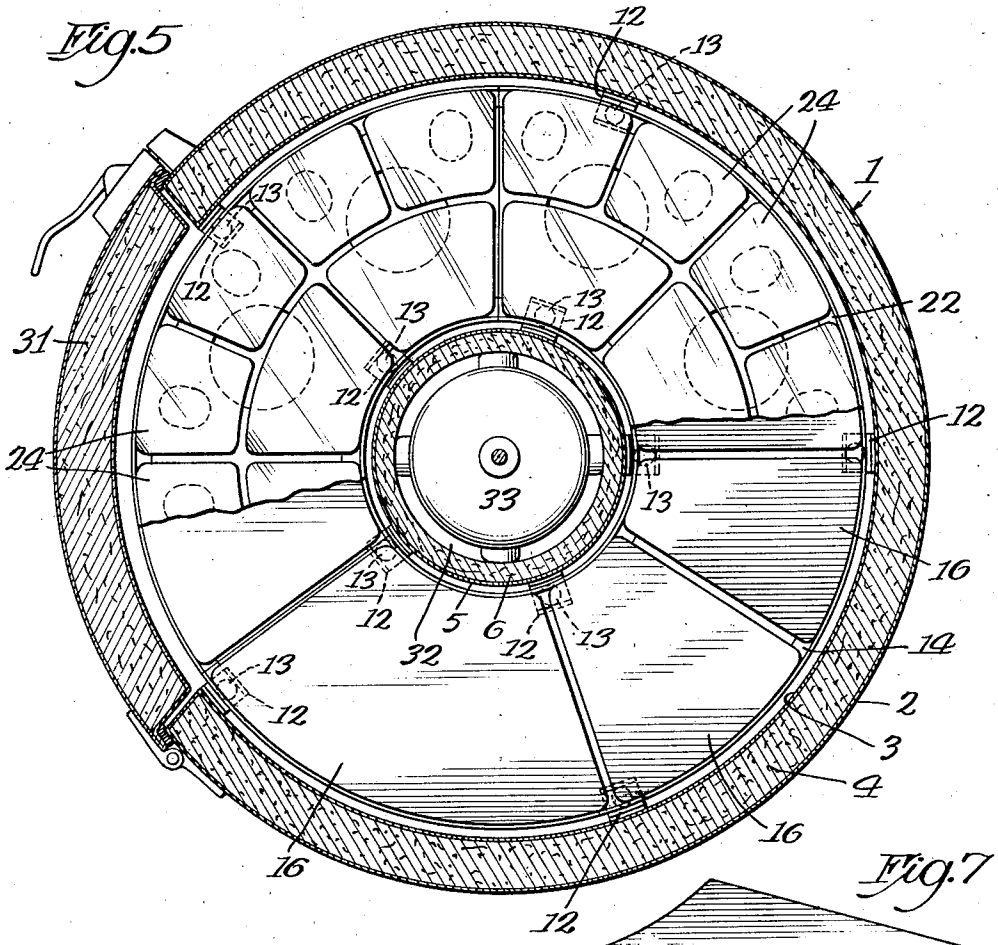


Fig. 6

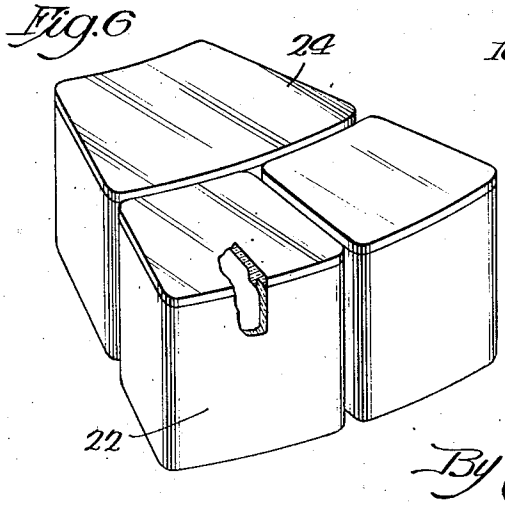
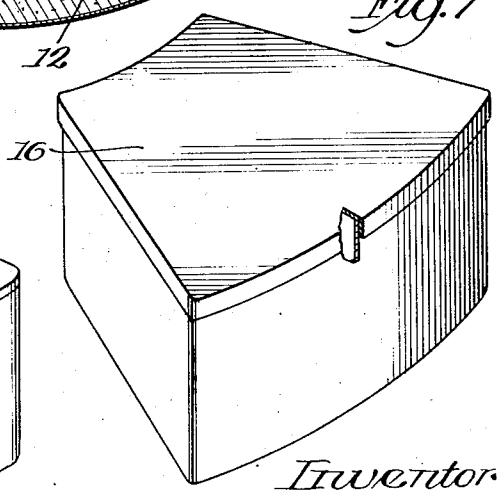


Fig. 7



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Fig. 8

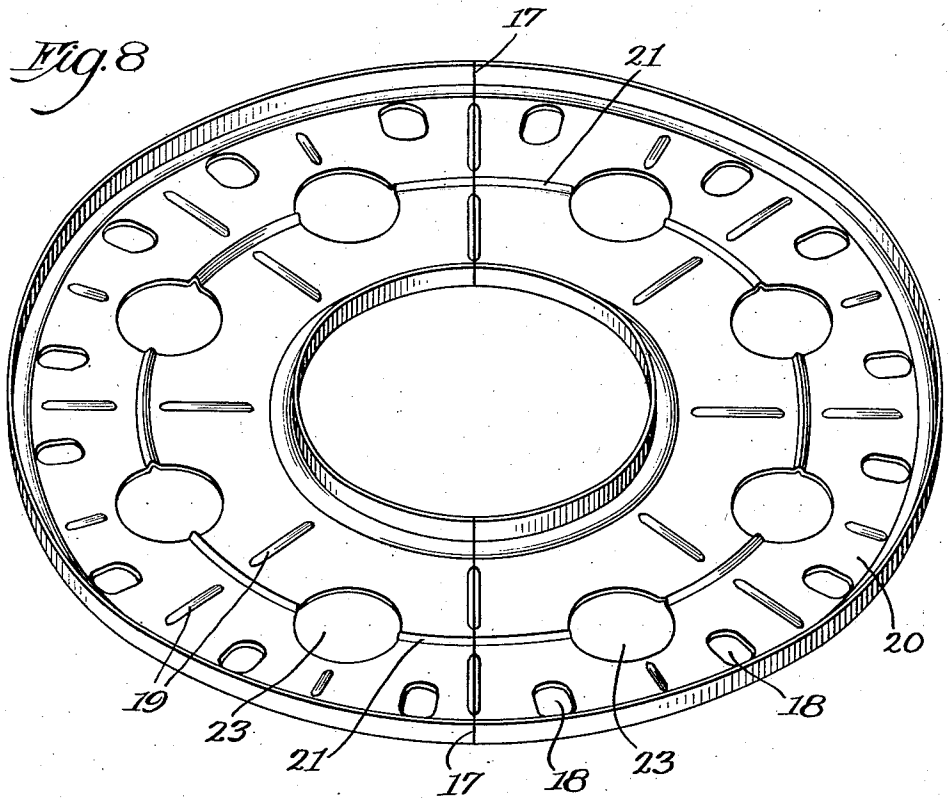


Fig. 9

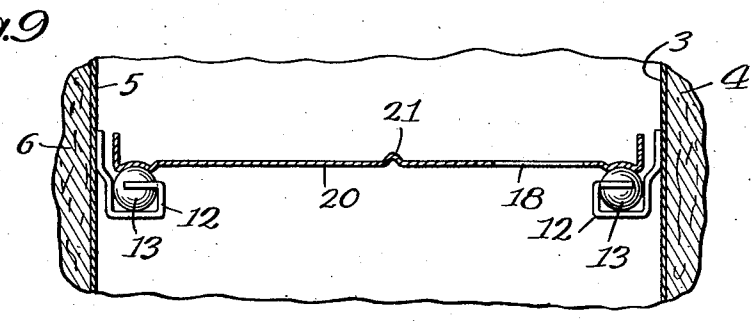
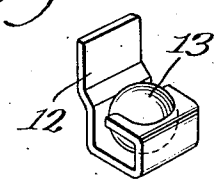


Fig. 10



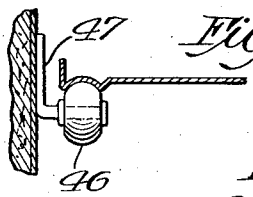


Fig. 11

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UNITED STATES PATENT OFFICE

2,091,292

REFRIGERATOR

Lewis H. Scurlock, Chicago, Ill.

Application November 16, 1934, Serial No. 753,267

22 Claims. (Cl. 62—116)

This invention relates to refrigerators, and more particularly to those that are round or cylindrical, vertically, in order to provide more satisfactory storage space provisions therein.

Generally stated, the object of the invention is to provide a novel and improved construction and arrangement whereby a refrigerator of this round or cylindrical type is more satisfactory in use, in various ways, than those heretofore used or proposed.

It is also an object to provide certain novel details and features of construction, and certain novel combinations, tending to increase the general efficiency and the desirability of a refrigerator of this particular character.

To the foregoing and other useful ends, the invention consists in matters hereinafter set forth and claimed and shown in the accompanying drawings, in which—

Fig. 1 is a perspective of a cylindrical refrigerator embodying the principles of the invention.

Fig. 2 is a similar view, but with the lower portion thereof shown broken away, and with the top cover shown in open position, thereby to expose to view the electric cook stove mounted on the top of the refrigerator.

Fig. 3 is a horizontal section on line 3—3 in Fig. 4 of the drawings.

Fig. 4 is a vertical section on line 4—4 in Fig. 3 of the drawings.

Fig. 5 is a horizontal section on line 5—5 in Fig. 4 of the drawings.

Fig. 6 is a perspective view, on a larger scale, of one of the groups of containers employed within the refrigerator.

Fig. 7 is a similar view, on a larger scale, of one of the larger containers employed within the refrigerator.

Fig. 8 is a perspective view, on a larger scale, of one of the rotary or revolving shelves employed within the refrigerator.

Fig. 9 is an enlarged fragmentary sectional view showing the ball bearing supports for the revolving shelves of the refrigerator.

Fig. 10 is a perspective of one of the ball bearing brackets that support the rotary or revolving shelves.

Fig. 11 is a detail fragmentary sectional view illustrating a different form of support for the shelves.

As thus illustrated, the cylindrical body 1 of the refrigerator comprises the cylindrical outer walls 2 of sheet metal, and the inner cylindrical walls 3 of sheet metal, with insulation 4 between the sheet metal walls. Located at the center of the refrigerator body is a vertical tube, in effect, comprising a cylindrical sheet metal tube 5 having a tube 6 of insulation therein, forming a vertical central space from the top to the bottom of the refrigerator.

The body thus formed has a removable top wall or cover 7 composed of sheet metal filled with insulation and shaped to fit upon the upper end of the body, and over the upper end of the said central tube of the body, in the manner shown more clearly in Fig. 4 of the drawings. The bottom 8 of the body is also formed of sheet metal, filled with insulation, and legs or feet 9 are preferably provided to support the bottom a distance above the floor. Preferably, the central space of the refrigerator has a lower opening 10 through which air enters, and the air is discharged through a horizontal passage 11 formed in the top or cover 7 of the refrigerator.

Near the bottom of the interior of the refrigerator are brackets 12, of the kind shown more clearly in Fig. 10 of the drawings, secured to the side walls of the refrigerator, and each provided with a ball 13, as shown. The sheet metal shelf 14 is in the form of a flat ring with its inner and outer edges turned up to form flanges 15, the shelf encircling the tubular vertical core of the refrigerator and resting on the balls 13, the shelf having concentric grooves on its bottom to engage said balls, whereby the shelf may be caused to rotate or revolve about the vertical axis of the refrigerator, on said balls, the latter being loosely held in their respective brackets. On said shelf 14 are wedge-shaped containers 16 of the kind shown more clearly in Fig. 7 of the drawings. This shelf 14 is practically the same as the one shown in Fig. 8 of the drawings, being split or divided at 17, so that it is composed of two half circles, with the ends butted together, adapted to rotate in unison on the ball bearing brackets previously mentioned. However, the shelf 14 does not need the finger holes 18 shown in Fig. 8, inasmuch as it is too low down or too near the bottom 8 of the refrigerator, but it may have the radial ribs 19, shown in Fig. 8 of the drawings, defining the radial divisions between the wedge-shaped containers 16 employed on this shelf, each container having a suitable top cover.

The similar shelf 20 may be exactly like the one shown in Fig. 8 of the drawings, having the circular ribs 21, as well as the radial ribs 19 previously mentioned, and having the finger holes 18 to admit the insertion of a finger upwardly against the bottom of any one of the glass jars or containers 22, shown more clearly in Fig. 6 of the

drawings, and having the larger openings 23 to permit a finger to be placed against the bottom of any one of the containers 24, also shown in Fig. 6 of the drawings, thereby to facilitate the removal of any one of these containers, the latter preferably having flat covers, as shown.

A third shelf 25, similar to the one shown in Fig. 8, or of any suitable character, is mounted on similar ball bearing brackets, and may be employed to support various things within the refrigerator.

A distance above the shelf 25 are the radial supports 26, fastened at their ends to the vertical walls of the refrigerator, thereby to support the ball bearing brackets 27 in position to support the rotary or revolving shelf 28, which latter is a similar flat sheet metal ring made in two sections and provided with upturned flanges as shown, whereby it is adapted to revolve or rotate about the vertical axis of the refrigerator. Wedge-shaped metal trays 29 are removably supported on the shelf 28, as shown in Figs. 3 and 4 of the drawings, to serve as ice trays for freezing water, or to support food or any other desired commodity.

The front of the refrigerator has the upper and lower doors 30 and 31, and by opening these doors, any of the said shelves can be rotated or revolved, thereby to bring any container or tray opposite the door and in position to be easily removed. These doors are preferably formed of sheet metal and filled with insulation, and they are curved about the axis of the refrigerator, so that the entire body of the structure is cylindrical vertically.

For refrigerating purposes, a direct connected motor and pump unit is located within the vertical space or chamber 32, within the walls 5 and 6, composed of the electric motor 33 supported near the bottom of the refrigerator, and the rotary pump 34 suitably supported at a point above, with a separable coupling 35 between them. The upper end of the pump shaft has a fan 36 to blow air upwardly against the coils 37 that contain the refrigerating fluid, to cool the latter, these coils being connected with the coils 38 that partially encircle the hollow core of the refrigerator, within the interior of the refrigerator, above the rotary or revolving shelf 28, whereby to freeze water or other things in the trays 29 previously mentioned, these coils having connections 39 and 40 to the top and bottom, respectively, of the pump 34 previously mentioned. In this way, the coils 38 are effective for the desired purpose, but do not obstruct the door opening, so that the trays on the shelf 28 can be easily removed by opening the door. The air that enters the hollow central space of the refrigerator through the bottom opening 10 is blown out through the horizontal passage 11, previously mentioned, and thus the refrigerating fluid is cooled in the usual and well understood manner, after circling through the coils 38, which latter serve to keep the temperature within the refrigerator at the desired point.

Therefore, for the purpose of repair or substitution, the cover 7, which latter can be fastened in place by any suitable or desired means, can be removed from the top of the refrigerator body, and the refrigerating machinery, including the motor, the pump and the coils, can be lifted out of the top of the refrigerator structure, vertical brackets 41 being preferably provided to space the coils 38 from the side walls of the refrigerator body.

It will be understood, of course, that the coils 38 do not need to be removed, when the apparatus within the hollow core of the refrigerator is removed upwardly, and that for this purpose suitable couplings can be employed to uncouple the coils 37 from the coils 38, when it is desired to remove the compressor machine that in effect forms the vertical core of the refrigerator.

The height of the refrigerator is preferably such that its top may be conveniently used as a cooking stove by the use of electric griddles 42 of any suitable character, covered by a sheet metal cover 43 hinged to the body at 44, a hinged brace 45 being mounted on the side of the refrigerator to serve as a supporting brace for said cover, when the latter is open and in the horizontal position shown in Fig. 2 of the drawings, in order that the said cover may serve as a support for dishes or other things while the top of the refrigerator is being used as a cooking stove.

A combined refrigerator and electric cooking stove, the kind shown and described, is compact and symmetrical and may be used to advantage and with convenience in small apartments or living quarters where ordinary refrigerators and cooking stoves could not be employed. Inasmuch as the rotary or revolving shelves, shown and described, are each made in two pieces, the doors of the refrigerator may be more or less narrow, if desired, as the sections of the shelves can be easily inserted and removed, regardless of the width of the doors. Also, the construction shown and described obviates the necessity of providing circular brackets or raceways for the balls, as the grooves on the bottoms of the shelves are really raceways for the balls, while the latter remain in fixed position on the side walls of the refrigerator. Also, by making the refrigerating machine in the form of a vertical core in the refrigerator, the height of the latter may be less than usual, in a refrigerator of any given capacity having the compressor machine forming a part thereof. Of course, the refrigerator shown and described could be employed in connection with a compressing machine located in the basement, or at some point more or less remote from the refrigerator, if desired, and in that event the vertical space 32 could be employed for some other purpose. But this space preferably contains the machine for circulating the refrigerating fluid, and in that event the machine is preferably a direct connected motor and pump unit, as shown and described, with the coils for cooling the fluid forming the upper end of the unit.

In Fig. 11, the anti-friction support for the rotary shelf is substantially the same as that described, except that in this case it consists of a wheel or roller 46 mounted on a stationary bracket 47 secured to the side wall of the refrigerator, with the shelf supported thereon, in the manner shown. This is merely a substitute for the ball supports previously shown and described.

By omitting the openings 10 and 11, and the insulation 6, the central space provided within the vertical tube 5 can be used to hold ice, dry ice, or any suitable refrigerant, if it be desired to use the structure as an ordinary ice box, instead of a refrigerator with a circulating refrigerant.

While both the exterior and the interior of the refrigerator are shown as being cylindrical, it is obvious that the exterior may be square or rectangular, or polygonal, but with the interior cylindrical and equipped with shelving and refrigerating apparatus, exactly as shown and de-

scribed, without departing from the spirit of the invention, although for equally obvious reasons it is more logical and preferable to have the exterior of the refrigerator cylindrical, or approximately so.

From the foregoing, and from the drawings, it will be seen that the refrigerating chamber, within the outer walls of the cabinet, at the top of which chamber the cooling unit coils **38** are located, and the sub-chamber **32**, which contains the motorized or circulating unit, are parallel and in non-communication with each other. An electric motor is shown, for the circulating unit, but the latter may be operated in any suitable known or desired manner, in order to circulate the refrigerating fluid in the cooling unit **38**, and in order to force air through the sub-chamber against the coils **37** to cool the refrigerating fluid. When an electric motor is used, the compressor **34** is preferably disposed between said motor and the fan, and the latter is preferably above, in order to blow air upwardly through the sub-chamber against the coils **37**, as shown and described, but the elements of the circulating unit can be given any suitable or desired relative arrangement, and while a direct coupling **35** is shown between the motor and compressor, it is obvious that any suitable power transmitting connection can be employed between the motor and the compressor.

What I claim as my invention is:

1. In a refrigerator, a cylindrical hollow body having its side walls curved about the vertical axis of the refrigerator and having means forming a fixed vertical tube at the center of the refrigerator, flat rotary or revolving shelving encircling said tube and mounted to revolve about said axis, a cooling unit within the space between the outer walls of the refrigerator and the sides of said tube, a machine for circulating a refrigerating fluid in said cooling unit, and a door for the side of the body, curved about said axis, said machine being enclosed by said tube, with an air inlet at the bottom of the tube, and an air outlet at the top of the tube.

2. In a refrigerator, a cylindrical hollow body having its side walls curved about the vertical axis of the refrigerator and having means forming a fixed vertical tube at the center of the refrigerator, flat rotary or revolving shelving encircling said tube and mounted to revolve about said axis, a cooling unit within the space between the outer walls of the refrigerator and the sides of said tube, a machine for circulating a refrigerating fluid in said cooling unit, and a door for the side of the body, curved about said axis, said machine comprising a motor in the lower portion of said tube, a compressor above said motor, operatively connected to the latter, a fan at the upper end of the compressor, and coils in the upper portion of the tube above said fan for cooling the refrigerating fluid

3. In a refrigerator, a cylindrical hollow body having its side walls curved about the vertical axis of the refrigerator and having means forming a fixed vertical tube at the center of the refrigerator, flat rotary or revolving shelving encircling said tube and mounted to revolve about said axis, a cooling unit within the space between the outer walls of the refrigerator and the sides of said tube, a machine for circulating a refrigerating fluid in said cooling unit, and a door for the side of the body, curved about said axis, said cooling unit comprising coils disposed above said shelving, partially encircling said tube, leaving said door opening unobstructed, with means on the shelving for supporting trays within the coils.

4. In a refrigerator, a hollow cabinet having the inner surface of its side walls curved about the vertical axis of the refrigerator and having means forming a fixed vertical tube at the center of the refrigerator, flat rotary or revolving shelving encircling said tube and mounted to revolve about said axis, a cooling unit within the space between the outer walls of the refrigerator and the sides of said tube, a machine for circulating a refrigerating fluid in said cooling unit, and a door for the side of the cabinet, curved on its inside about said axis, said machine being disposed within said tube in order to bring the top of the refrigerator down to convenient cooking stove height, while providing a refrigerating chamber of substantial height, and electric heating means on the top of the refrigerator,whereby said cabinet is a combined refrigerator and stove body.

5. In a refrigerator, a cylindrical hollow body having its side walls curved about the vertical axis of the refrigerator, having means forming a fixed vertical tube at the center of the refrigerator, flat rotary or revolving shelving encircling said tube, adapted to revolve about said axis, a cooling unit within the space between the outer walls of the refrigerator and the sides of said tube, a machine for circulating a refrigerating fluid in said cooling unit, and a door for the side of the body, curved about said axis, said machine being disposed within said tube in order to bring the top of the refrigerator down to convenient cooking stove height, and electric heating means on the top of the refrigerator, together with a hinged cover for normally concealing said cooking means, and means for supporting said cover upside down in substantially horizontal position for use as a convenient table while the cooking means are in use.

6. A cylindrical refrigerator provided with shelving shaped to form a revolving tray, means for freezing water carried by the tray, and means for supporting the shelving for rotation about the vertical axis of the refrigerator.

7. In a refrigerator, a body having its interior formed cylindrically about a vertical axis, a central vertical tube in said body, concentric to the latter, revolving shelving in said body, between the sides of the latter and the sides of the tube, and means supported on the sides of said tube for rotatively supporting the shelving, a cooling unit in the upper portion of said body, and means within said tube for circulating a refrigerant in said unit.

8. In a refrigerator, a body having its interior formed cylindrically about a vertical axis, a central vertical tube in said body, concentric to the latter, revolving shelving in said body, between the sides of the latter and the sides of the tube, and means supported on the sides of said tube for rotatively supporting the shelving, comprising a cooling unit in the upper portion of said body, and means within said tube for circulating a refrigerant in said unit, together with a coil in the upper portion of said tube for cooling said refrigerant, there being an air outlet at the top of said tube, and an air inlet at the bottom thereof.

9. A refrigerator body having its interior cylindrically formed about a central vertical axis, refrigerating apparatus having a cooling unit located in the upper portion of the interior of said

body, curved about said axis, and revolving shelving within said interior, rotatable about said axis, and disposed below said cooling unit, to support things in the refrigerator, together with a door opposite said unit, the latter having a gap in the outer side thereof to permit the insertion and removal of said things.

10. A structure as specified in claim 9, comprising revolving shelving mounted to support water trays successively in register with said gap.

11. A structure as specified in claim 9, said shelving having provisions for holding wedge-shaped containers disposed thereon, side by side in a circle about said axis, said shelving having means to indicate the positions for the containers thereon, and having openings to expose a portion of the bottom of each container, to facilitate removal thereof from the shelving.

12. In a refrigerator, a circular rotary support for containers arranged in a plurality of circles, about the central vertical axis of the refrigerator, having radial ribs defining the radial divisions between the containers, and having circular concentric rib means defining the divisions between the containers of one circle and those of another, the outer edge of the support having upturned flange means to engage the containers of the outer circle, and the support having openings therein to enable a finger to be placed against the bottom of each of the containers.

13. A structure as specified in claim 12, said support being formed in arcuate sections with the edges of the ends thereof butted together.

14. In a refrigerator, a body having a refrigerating chamber therein, with a relatively small sub-chamber extending vertically within said body and thermally insulated from said refrigerating chamber, a cooling unit in the upper portion of said refrigerating chamber, and a refrigerant liquefying unit in said sub-chamber for circulating the refrigerating fluid through said cooling unit and for forcing air through said sub-chamber to cool said fluid, said refrigerant liquefying unit comprising a condenser in the upper portion of said sub-chamber, a motor driven compressor and fan unit having a vertical axis of rotation, with the fan facing the under side of said condenser, and with the latter connected between the compressor and the cooling unit, the lower end of said compressor unit being disposed at the bottom of said sub-chamber.

15. A structure as specified in claim 14, which structure includes a cover having an air passage therein forming an outlet for the sub-chamber and in which said circulating and liquefying unit is removable vertically from the sub-chamber when the cover is removed.

16. In a refrigerator, a body having a refrigerating chamber therein, with a relatively small sub-chamber extending vertically in said body and separated from said refrigerating chamber, a cooling unit in the upper portion of said refrigerating chamber, and a circulating unit in said sub-chamber for circulating the refrigerating fluid through said cooling unit, and for forcing air through said sub-chamber to cool said fluid, said circulating unit comprising a motor and compressor and fan and condenser connected in operative relation and disposed vertically one above another, with an air inlet at the bottom of the sub-chamber and an air outlet at the upper end thereof, for the upward circulation of air in said sub-chamber, the circulating unit and said sub-chamber being arranged to permit the withdrawal of the unit through the upper end of the sub-chamber.

17. A structure as specified in claim 16, said fan being disposed between the compressor and the condenser, with the latter at the top of the unit.

18. A structure as specified in claim 16, said sub-chamber being round and its axis being coincident with the axis of the circulating unit therein.

19. A structure as specified in claim 16, said circulating unit having an axial coupling in the vertical axis of rotation thereof, so that a portion of this unit can be lifted out of the top of said body, leaving the lower portion thereof in the sub-chamber.

20. A structure as specified in claim 16, said fan being disposed between the compressor and the condenser, and the latter being disposed between the fan and the motor, with the latter being disposed in the bottom portion of the sub-chamber.

21. A structure comprising a cabinet and an electric stove carried thereby, said cabinet having therein a main food storage compartment; a supplemental compartment in said cabinet, heat insulated from and non-communicating with said main compartment, and having arranged therein in substantial alignment a compressor, a motor for driving the same, a condenser connected to the compressor and a fan, forming a vertically disposed circulating unit; a cooling unit in said food storage compartment and connected to said condenser; and an insulating cover arranged to form the top of said food compartment and the base of said stove; and means forming a lower air inlet and an upper air outlet for said supplemental compartment.

22. A structure as specified in claim 21, having a swinging cover for said stove, and means for holding the cover in position to form a table or support at one side of the cabinet, when the stove cover is swung open.

LEWIS H. SCURLOCK.