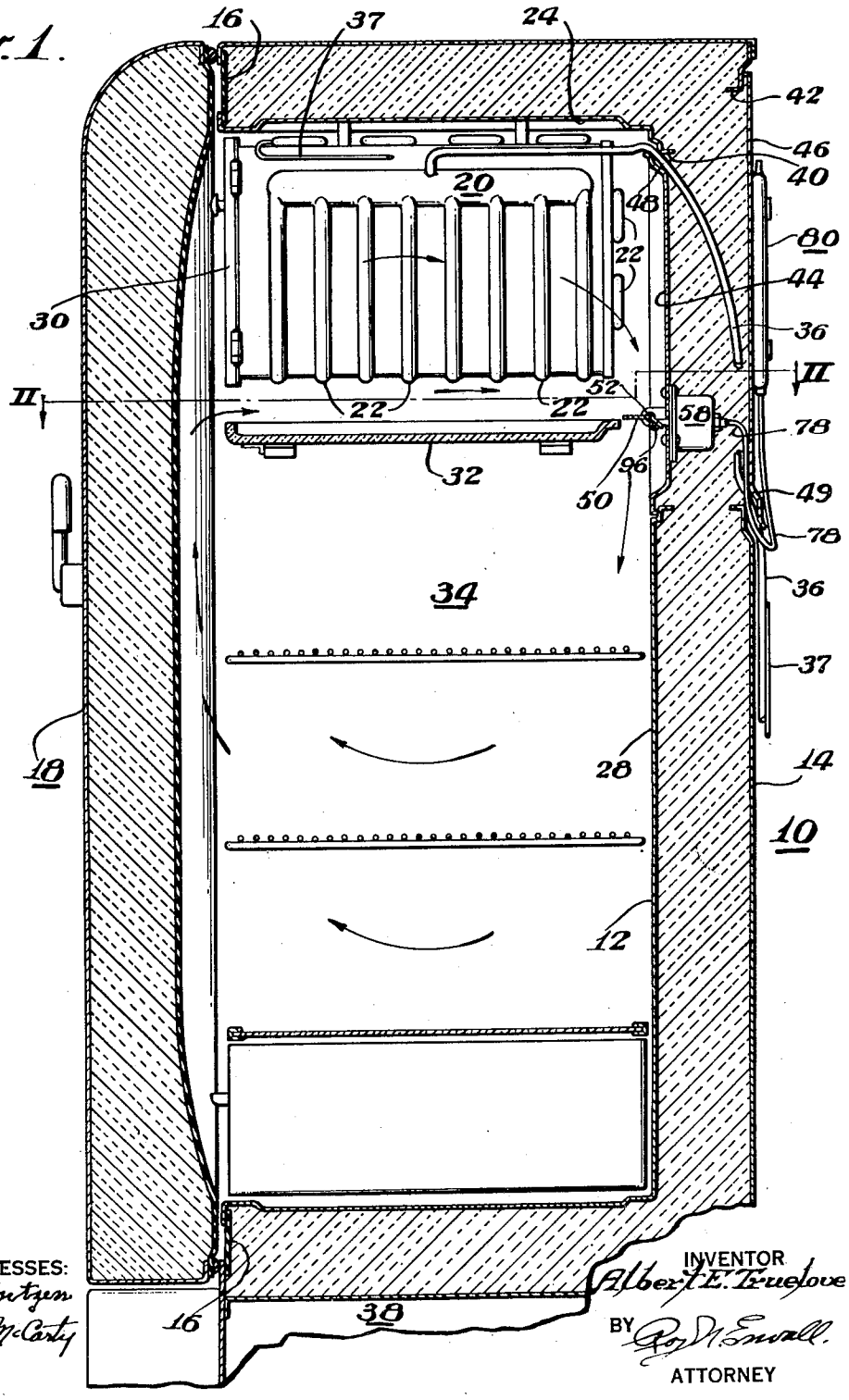
March 14, 1950 A. E. TRUELOVE 2,500,779

REFRIGERATION APPARATUS HAVING A DAMPER CONTROLLED BY A THERMOSTAT

Filed June 27, 1947 2 Sheets-Sheet 1

Fig. 1.



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REFRIGERATION APPARATUS HAVING A DAMPER CONTROLLED BY A THERMOSTAT

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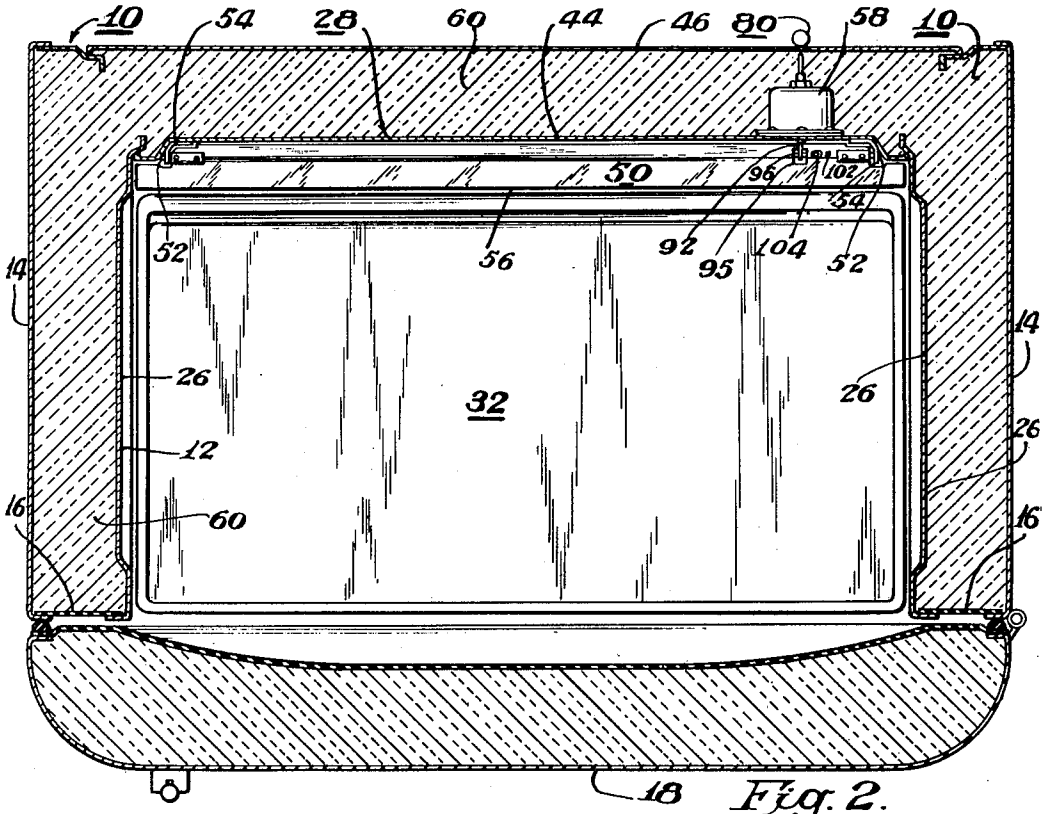


Fig. 2.

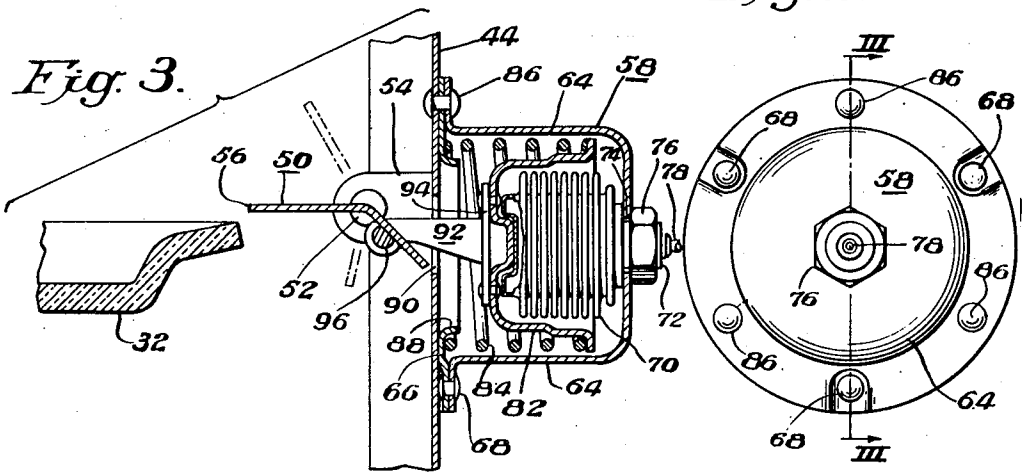


Fig. 4.

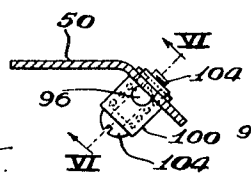


Fig. 5.

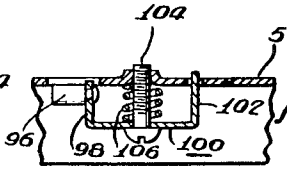


Fig. 6.

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Patented Mar. 14, 1950 2,500,779

UNITED STATES PATENT OFFICE

2,500,779

REFRIGERATION APPARATUS HAVING A DAMPER CONTROLLED BY A THERMOSTAT

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Application June 27, 1947, Serial No. 757,547

5 Claims. (Cl. 62—2)

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This invention relates to refrigerator thermostats and to the installation of such thermostats in a refrigerator cabinet.

It is an object of the invention to provide a compact arrangement of the elements of a thermostat.

It is another object of the invention to provide an assemblage of temperature-regulating members into a subassembly which may be installed in a refrigerator as a unit.

These and other objects are effected by my invention as will be apparent from the following description and claims taken in connection with the accompanying drawings, forming a part of this application, in which:

Fig. 1 is a vertical section of a refrigerator incorporating the thermostatic elements of this invention;

Fig. 2 is a horizontal sectional view on the line II—II of Fig. 1;

Fig. 3 is an enlarged vertical sectional view of the temperature-controlling elements of this invention, the view being taken on the line III—III of Fig. 4;

Fig. 4 is a side elevation of the operating elements of the thermostat shown in Fig. 3;

Fig. 5 is a detail view of the adjusting device of the thermostat; and

Fig. 6 is a sectional view on the line VI—VI of Fig. 5.

Referring to the drawings, the reference numeral 10 designates a refrigerator cabinet which comprises an inner metal liner 12 and an outer metal shell 14 spaced from the inner liner 12. The front edges of the liner 12 and of the shell 14 are joined by a heat breaker strip 16. The front opening of the cabinet 10 is closed by a door 18. A rectangular cooling unit 20 comprising the refrigerant passages 22 is secured in the upper portion of the cabinet 10. This cooling unit 20 is of the type claimed in the patent application of J. N. Saler, filed May 10, 1946, Serial No. 668,950. The cooling unit 20 is spaced from the upper wall 24, the side walls 26 and the rear wall 28 of the liner 12 to provide air-circulating passages around the cooling unit 20. The front of the cooling unit is closed by a door 30 which likewise is spaced from the door 18 of the cabinet 10 to provide an air passage.

A defrost pan 32 of thermal insulating material is located below the cooling unit 20 and is spaced therefrom to provide an air passage between the cooling unit 20 and the pan 32. The front edge of the pan 32 is spaced from the door 18 and the rear edge of the pan 32 is spaced from the rear wall 28 of the liner 12 to provide an air passage at the front and another at the rear edge of the pan 32, which passages communicate with the passages at the front and the rear of the cooling unit 20. The side edges of the pan 32

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extend substantially to the side walls 26 of the inner liner 12. The cooling unit 20 is maintained at a temperature of about 0° F. for the storage of frozen food and the food storage compartment 34 is maintained at a temperature of about 40° F. by means which will be described subsequently.

Refrigerant passages 36 and 37 connect the cooling unit 20 with the refrigerant-supplying apparatus (not shown) located in a machine compartment 38 below the food storage compartment 34. An opening 40 is provided in the inner liner 12 to the rear of the cooling unit 20, and a second opening 42, registering with the opening 40, is formed in the outer shell 14. These openings are utilized during the assemblage of the refrigerator for inserting the cooling unit 20 into the cabinet 10 in the general manner described in Patent No. 2,279,272 issued April 7, 1942 to W. B. Anderson. A metal plate 44 closes the opening 40 and a second metal plate 46 closes the opening 42. An indentation 48 is formed in the upper edge of the plate 44 and a similar indentation 49 is formed in the lower edge of the plate 46 to form passages for the refrigerant tubes 36 and 37.

A shutter 50 is located in the space between the rear edge of the defrost pan 32 and the plate 44 to regulate the circulation of air through the cabinet. This shutter 50 is provided with pins 52 which are pivoted in brackets 54 affixed to the rear plate 44. When in its farthermost closed position (shown in Figs. 1 and 3), the front edge 56 of the shutter 50 lies near to but spaced from the rear edge of the pan 32, the space prever ting freezing of the shutter 50 to the pan 32. The shutter 50 is actuated by a thermostatic device 58 which is affixed to the rear wall of the plate 44. The spaces between the inner liner 12 and the outer shell 14 and between the plates 44 and 46 are packed with loose thermal insulating material 60.

The air circulation within the cabinet 10 is by natural convection. The warmest areas within the refrigerator are near the door 18 and the coldest areas are near the rear wall of the cabinet 10. When the shutter 50 is open, the natural convectional air currents will thus be upwardly along the door, then over the cooling unit 20, then downwardly along the rear wall of the cabinet 10 and forward through the food storage space 34. This circulation is indicated by arrows in Fig. 1. When the shutter 50 is closed, this circulation is retarded sufficiently to cause the temperature in the food storage compartment 34 to rise.

The details of the elements of the thermostat 58 are shown in Figures 3 to 6, inclusive. The housing consists of a cup-shaped container 64 and a cover 66 therefor which is secured to the container 64 with three rivets 68. A cylindrical metal bellows element 70 is secured in the cup 64

by means of a threaded stud 72 attached to one wall of the bellows 70. The stud 72 projects through an opening 74 in the base of the cup 64 and is engaged by a nut 76 on the outer wall of the cup 64. The stud 72 has an axial bore which connects through a tube 78 with a metal bulb 80.

A second cup-shaped element 82 partially surrounds the bellows 70 and bears at its base against the movable wall of the bellows 70. The rim of the cup 82 is flanged outwardly. A compression spring 84 partially surrounds the cup 82 and bears at one end against the flange thereof and at its other end against the cover 66.

The housing 64, 66 is secured by three rivets 86 to the rear surface of the plate 44. The plate 44 and the cover 66 have registering openings 88 and 90 through which an operating arm 92 extends. The operating arm 92 has a flange 94 secured by two rivets to the base of the cup 82 so that the arm 92 moves with the cup 82.

The operating arm 92 extends through a slot 95 in the shutter 50 and engages a pin 96 affixed thereto to operate the shutter 50. The pin 96 may be fixed to but preferably is adjustable with respect to the shutter 50 and for this purpose is connected to one of the legs 98 of a U-shaped member 100. The other leg 102 engages a hole in the shutter 50. A screw 104 projects through an opening in the base of the U-shaped member 100 and is in threaded engagement with the shutter 50. A compression spring 106 is coiled around the screw 104 and biases the U-shaped member 100 against the head of the screy 104. Turning this screw 104 thus moves the U-shaped member 100 and the pin 96 secured thereto towards or away from the shutter 50. This adjustment permits varying the temperature at which the food storage compartment 34 is maintained.

The bulb 80, the tube 78 and the bellows 70 contain a volatile fluid and the bulb 80 is located on the rear wall of the cabinet 10 in heat-transfer relation with an ambient temperature of the refrigerator. This arrangement is claimed in the patent application of R. E. Tobey filed October 8, 1945, Serial No. 621,058, now Patent No. 2,480,617, granted August 30, 1949.

In assembling the refrigerator, the rear plate 44, the shutter 50 and the thermostat may be assembled as a unit and this unit installed in the cabinet after the evaporator has been inserted through the openings 40 and 42 and is secured in place.

It will be observed that the thermostatic elements in the housing 64, 66 are compactly arranged and operate without friction. The plate 44, the shutter 50, and the thermostat 58 furthermore provide a unitary structure which facilitates the assembly of the refrigerator.

While I have shown my invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof.

What I claim is:

1. A refrigerator comprising a liner having an opening in the upper portion of a side wall thereof, a plate removably secured to close said opening, thermal-insulating material on the outer walls of said liner and plate, a cooling unit in the upper portion of said liner, said cooling unit being adapted for insertion through said opening into said liner during the assembly of the refrigerator, a generally horizontal partition in said liner below said cooling unit, said partition having one edge spaced from said plate to provide an opening for air circulation, a shutter hinged to said plate and adapted in one position to substantially close said last-named opening, a thermostatic element secured to said plate, a connection between said element and said shutter to actuate the shutter to open and substantially close said last-named opening, said plate, shutter, and thermostatic element being securable as a unit to said cabinet during the assembly thereof.

2. A refrigerator according to claim 1 in which said connection is adjustable to vary the setting of said shutter with respect to said thermostatic element.

3. A refrigerator according to claim 1 in which the thermostat comprises a casing secured to the rear wall of said plate and located in said thermal insulation, a bellows in said casing bearing against the wall thereof remote from said plate, the wall of said bellows nearest to said plate being movable, a U-shaped rigid member having flanges at its extremities, said member bearing with its base against the movable wall of said bellows and at least partially straddling the bellows with its legs, a helically-coiled compression spring surrounding said straddled portion of said bellows, one end of said spring engaging said flanges and the other end of said spring being secured in said casing, said spring biasing said rigid member in a direction to compress said bellows, said connection engaging said rigid member, and means responsive to temperature for subjecting the interior of said bellows to a fluid under pressure.

4. A refrigerator comprising a liner including a removable plate secured to said refrigerator for closing an opening in said liner, a cooling unit in the upper portion of said liner, said cooling unit being adapted for insertion through said opening into said liner during the assembly of the refrigerator, a partition in said liner below said cooling unit, said partition being spaced from the bottom wall of said liner to form a food storage compartment in said liner, said refrigerator having an air passage for the circulation of air between said cooling unit and said storage compartment, a shutter hingedly secured to said plate and adapted in one position to substantially close said passage, a thermostatic element secured to said plate, a connection between said element and said shutter to actuate the shutter to open and substantially close said passage, said plate, shutter, connection, and thermostatic element being securable as a unit to said refrigerator during the assembly thereof.

5. The refrigerator defined in claim 4, wherein the partition is generally horizontal.

ALBERT E. TRUELOVE.

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