July 22, 1958 V. G. SHARPE 2,844,111

REFRIGERATING APPARATUS DOOR CONTROL MECHANISM

Filed Sept. 8, 1955

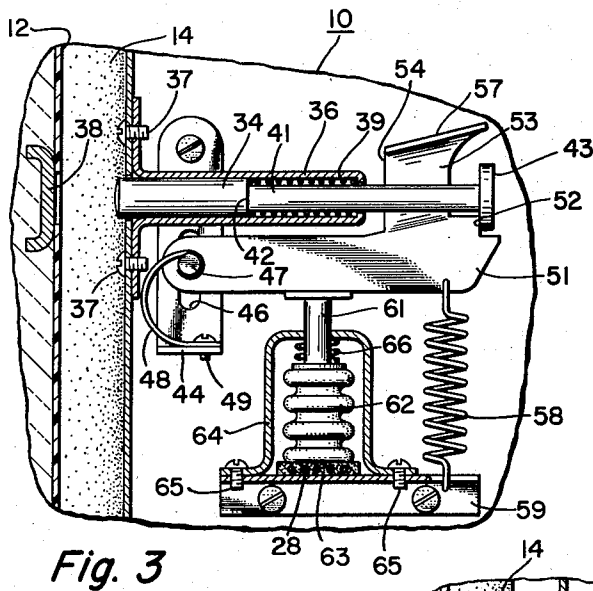


Fig. 3

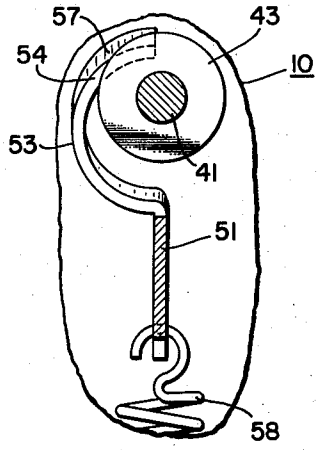


Fig. 5

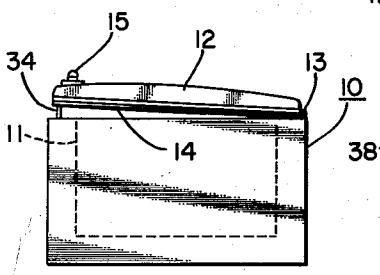


Fig. 2

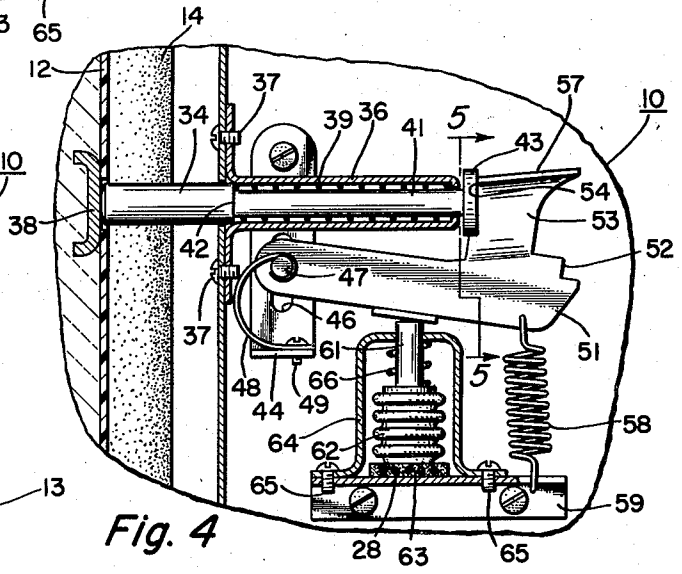


Fig. 4

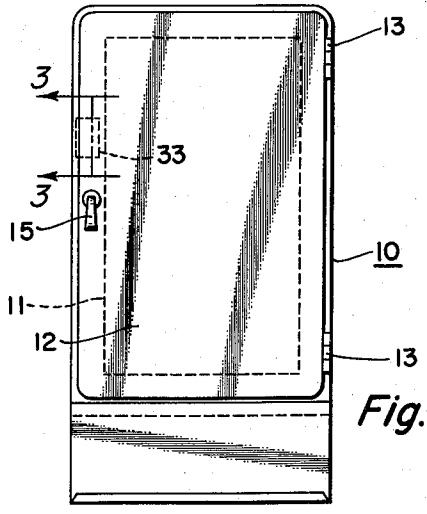


Fig. 1

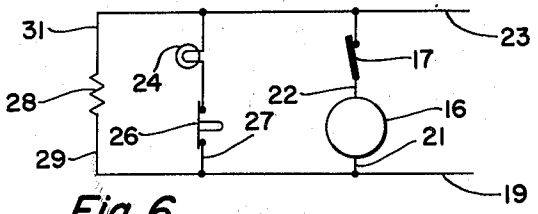


Fig. 6

INVENTOR.
Verlos G. Sharpe.
BY
R. R. Candor.
His Attorney.

United States Patent Office

2,844,111

Patented July 22, 1958

2,844,111

REFRIGERATING APPARATUS DOOR CONTROL MECHANISM

Verlos G. Sharpe, Dayton, Ohio, assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware

Application September 8, 1955, Serial No. 533,063

1 Claim. (Cl. 109—63.5)

This invention relates to refrigerators and particularly to safety doors therefor.

I am aware of the fact that considerable work has recently been done to provide safety devices in latch mechanisms of doors pivotally mounted on household refrigerator cabinets which are intended to permit or allow a child, upon accidently becoming trapped in a compartment or chamber of a discarded or abandoned refrigerator cabinet, to merely push on the door from within the cabinet and swing it open in order to escape therefrom. Refrigerator cabinet doors are usually rather large and heavy and it has been found that refrigerator cabinets are frequently turned on their back when dumped at junk yards or dumping grounds. A safety device of the type just described on an abandoned refrigerator cabinet dumped on its back will not insure that a small child can escape from within the same when trapped in the cabinet thereof. In present day refrigerators the cabinet door is, when the cabinet is on its back, of such weight that it closes shut tightly against the cabinet irrespective of whether or not the latch is latched or released. Thus a small or a young child upon becoming trapped in a compartment of an abandoned refrigerator cabinet resting on its back does not have sufficient strength to overcome the weight of the door to raise it upwardly into an open position and will thus be suffocated therein. Safety devices which do not positively block a refrigerator cabinet door open, regardless of the position the cabinet may come to rest when dumped, fall short of insuring that a child will be prevented from losing his or her life therein and consequently fail to meet requirements of laws and ordinances now being drafted to correct this nation-wide hazard. I contemplate the provision on mechanically cooled refrigerator cabinets of a means which will, when a cabinet is discarded and dumped, insure against the loss of a child's life in a compartment thereof.

An object of my invention is to provide a refrigerator cabinet with a safety device of the type that will positively block the cabinet door open a sufficient distance to permit a young child or a small feeble child, as compared to an older or larger vigorous and stronger child, upon being trapped in a compartment of the cabinet to breathe freely, so as not to be suffocated, and to utter cries for help.

A further object of my invention is to provide an improved safety device for the door of a refrigerator cabinet which permits the door to be opened and closed in the usual manner, by manually operating a handle of a mechanically actuated door latching mechanism, as long as the refrigerator is being employed to preserve food products and which device prevents latching of the door closed when the cabinet is discarded.

A still further object of my invention is to provide a refrigerator cabinet with a door blocking means which is normally ineffective to block the door and is rendered operative or effective for blocking the door partially open and preventing latching thereof shut automatically in

response to disconnecting a detachable electric extension cord connected to a source of electric current and leading therefrom to electrically energizeable elements of a refrigerating system associated with the refrigerator and other elements in the refrigerator cabinet.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred form of the invention is clearly shown.

In the drawings:

Figure 1 is a front view of a household refrigerator having my invention incorporated therein;

Figure 2 shows the refrigerator disclosed in Figure 1 lying on its back with the food compartment door blocked open by a blocking device;

Figure 3 is an enlarged fragmentary sectional view taken in the line 3—3 of Figure 1 showing a door blocking device in a normal or ineffective position;

Figure 4 is a view similar to Figure 3 showing the blocking device holding the refrigerator cabinet door open;

Figure 5 is a fragmentary sectional view taken on the line 5—5 of Figure 4 showing a plunger locking means of the door blocking device;

Figure 6 is diagrammatic showing of an electric circuit for electrically energized elements associated with the refrigerator having the electric means of the present door blocking device interposed therein.

I show in Figure 1 of the drawings a refrigerating apparatus comprising a household refrigerator cabinet structure **10** having a plurality of insulated walls forming a food storage chamber or compartment **11** therein indicated by the dotted lines. Compartment **11** is provided with a front access opening and an insulated door structure **12** normally abuts against the cabinet to close the access opening. The door **12** includes inner and outer panels with insulating material disposed therebetween as is typical of such doors and conventional in the refrigerator art and consequently such doors are bulky and rather heavy as compared to thin uninsulated doors. Door **12** is pivotally mounted upon cabinet **10** by hinges **13** for swinging movement relative thereto to provide access to the interior of compartment **11**. The door **12** may have a part thereof disposed within the collar portion of the compartment access opening and has another portion overlapping the door jamb front face of cabinet **10**. A resilient compressible rubber-like gasket **14** (see Figures 2, 3 and 4) is secured to the overlapping portion of door **12** for sealingly engaging the front of cabinet **10** to close the food storage compartment **11** in substantially an air-tight manner. A manually operated mechanically actuated latch or latching mechanism having a keeper and keeper engaging elements or portions is located on cabinet **10** and/or door **12** on the side thereof opposite hinges **13**. The latch is preferably of the type which is tripped upon swinging the door **12** closed to latch or lock the door in that position. The latching mechanism is provided with a handle **15** which projects outwardly of door **12** and is operated from exteriorly of the cabinet in the usual or well known manner.

A refrigerating system associated with cabinet **10** includes a refrigerant evaporator (not shown), mounted in compartment **11** for cooling the interior thereof, a refrigerant translating unit including a motor and compressor driven thereby both sealed in a casing **16** and a thermostatic switch **17** (see Figure 6) responsive to refrigeration demands within compartment **11** for starting and stopping the motor. The detachable extension cord or electric circuit for the motor and switch **17**, ordinarily supplied with a refrigerator, and plugable into a wall or the like outlet receptacle of a source of electric current,

includes a wire 19 having a branch wire 21 leading to one side of a winding of the electric motor within casing 16. The other side of the winding of the motor within casing 16 is connected by wire 22 to the thermostat switch 17 and to the other wire 23 of the detachable cord or circuit. The circuit includes a food compartment illuminating lamp 24 and a door operating switch 26 therefor connected across the wires 19 and 23 by a branch wire 27 for energizing and deenergizing lamp 24 upon opening and closing movements of the refrigerator cabinet door 12. This detachable circuit is also provided with a resistance element or coil 28, for a purpose to be hereinafter described, connected by wires 29 and 31 to the wires 19 and 23 respectively so as to be energized at all times when the detachable extension cord is connected to the source of electric current. The motor-compressor unit 16 and other parts of the refrigerant translating device are adapted to be located in a machine compartment in the lower portion of cabinet 10 and connected in closed fluid flow circuit relationship by suitable pipes or conduits with the evaporator mounted in compartment 11 as is conventional in the art.

In order to carry out the objects of this invention I provide a means on one of the structures 10 or 12 and preferable within an insulated upright wall of cabinet structure 10 for blocking door 12 open to prevent the latch mechanism from latching or locking the door tightly closed. Reference to locking the door 12 as herein employed is to be distinguished from locking a door with a lock and key. In the present disclosure such locking of the door represents normal closing of the door whereby the latch latches the same shut against being opened until the latch handle 15 is operated to release the door from the cabinet. In other words the door is to be blocked open at a position to prevent the door gasket 14 from engaging the cabinet and sealing the compartment therein so that even if a discarded refrigerator cabinet is lying on its back the weight of the door cannot cause same to engage the cabinet and seal a compartment therein from air ambient thereto. The location of this door blocking means or device is indicated generally by the dotted lines 33 in Figure 1 and it is to be noted that it is disposed at the latch side of door 12.

Referring now to Figures 3 and 4 of the drawings the blocking means or element comprises or includes a plunger 34 disposed in a sleeve-like housing 36 mounted in any suitable manner upon cabinet 10, such as by screws 37, within a side wall of the cabinet at the door jamb thereof. Plunger 34 is adapted to be projected outwardly of the door jamb and locked in this position so as to be engaged by a rigid metal part or piece 38 on door 12 inwardly of the point at which gasket 14 engages the cabinet. A coil spring 39 surrounds a reduced portion 41 of plunger 34 and is normally compressed between a shoulder 42 thereon and the rear wall of sleeved housing 36 tending to force the plunger outwardly from the housing. The plunger 34 has a washer or the like 43 secured to its inner end, in any suitable or conventional manner, for a purpose to be presently described. A bracket 44 stationarily mounted on cabinet 10 has an elongated opening 46 therein and a pin 47 is disposed in this opening. A substantially U-shaped flat spring member 48 secured, by screws or the like 49, to a flange on a stationarily mounted bracket 44 holds the pin 47 in slot 46 to thus provide a spring mounted movable pivot point for one end of a lever or pawl 51 pivotally attached to pin 47. The other or opposite end of lever or pawl 51 is shaped to form a shoulder 52 thereon which is normally engaged by the washer end 43 of plunger 34 to maintain coil spring 39 compressed and the outer end of plunger 34 retracted within housing 36. Pawl on lever 51 has an integral portion 53 extending upwardly therefrom around plunger 34. The upper part of integral portion 53 of pawl or lever 51 is bent or rolled into the path of movement of plunger 34 to provide a plunger stopping or locking edge 54. The upper part of portion 53 is inclined, as at 57, upwardly from the plunger locking edge 54 thereof. A coil spring 58 has its one end hooked or fastened to the pawl 51 and has its other end held or fastened to a stationarily mounted bracket 59 and tends to pull the shouldered end 52 of this pawl downwardly out of the path of washer end 43 of plunger 34. A heat or the like electric motor means or element is also mounted on bracket 59 and is provided with a movable button 61 for engaging the underside of pawl or lever 51 intermediate its spring mounted end and the coil spring 58. Button 61 is carried on the upper end of a sealed expansible and contractable bellows 62 containing a volatile fluid. A heat conductive but electrically insulated disc or the like 63 is interposed between the lower closed end of bellows 62 and bracket 59. A retaining cage or the like 64 secured to bracket 59, by screws 65, locates the heat responsive motor unit in its proper place on the device and a coil spring 66 is disposed between cage 64 and the top of bellows 62. The electric resistance element or coil 28, shown in the electric circuit disclosed in Figure 6, is contained in disc 63 and is adapted to heat sealed bellows 62 to expand the fluid contained therein and cause movement of the bellows and consequently button 61. Heat motors of this type are now common and well known to those skilled in the art and any such motor may be employed in the present device. As long as the wires of the circuit in the detachable extension cord shown in Figure 4 of the drawings, including the wires 19 and 23 leading to the driving motor, for the compressor in sealed casing 16, of the refrigerating system associated with the present refrigerator cabinet, is connected to a source of electric current resistance element or coil 28 of the heat motor is energized to render the heat motor effective to hold pawl 51 in the position thereof illustrated in Figure 3 wherein the washer end 43 of plunger 34 abuts against shoulder 52 on the pawl. Plunger 34 is, in this position, ineffective to block closing of the refrigerator cabinet door 12 and therefore the door may be swung about its hinges 13 into open and closed positions in the usual manner. The spring mounting of the pivoted end of lever or pawl 51 permits this pivotal mount or pin 47 to move upwardly in opening 46 of bracket 44 relative to the heat motor should too much pressure be developed thereby to cause excessive movement of button 61 without damaging any of the parts of the door blocking device.

If the detachable extension cord, including the electric circuit and elements therein as shown in Figure 6 of the drawings, is disconnected from its source of electric current for any reason the resistance element or coil 28, is de-energized and the fluid in the heat motor cools to room temperature. The bellows 62 then contracts, aided by spring 66, and moves button 61 downwardly thus permitting coil spring 58 to pull the shouldered end 52 of pawl or lever 51 out of engagement with plunger 34. The spring 39 will now force plunger 34 a short distance outwardly of sleeved housing 36 so that the outer end of this plunger engages the metal piece 38 on door 12 while the door is closed. This position of the plunger and other parts of the blocking device is not illustrated in the accompanying drawings for the reason that door 12 at this time prevents outward movement of plunger 34 a sufficient distance to become locked in a door blocking projected location. A subsequent opening of door 12 permits spring 39 to force plunger 34 a greater distance outwardly of housing 36 whereupon the washer end 43 of the plunger rides along the inclined portion 57 of extension 53 on pawl or lever 51 to a position between the rear end of housing 36 and the plunger stopping edge 54 of the extension 53 on lever 51. The edge portion 54 on lever 51 is now in the path of return movement of plunger 34 and locks the plunger against such movement. Thus door 12 is blocked open, by the projected and locked plunger 34,

against being brought into abutting relation with cabinet **10** to tightly close the door and the latch or latching mechanism therefor cannot now lock the door closed (see Figures 2 and 4). The door gasket **14** does not engage cabinet **10** and consequently air ambient to the cabinet may freely flow into compartment **11**.

When the source of electric current to the refrigerator becomes temporarily interrupted due to a summer storm or any other cause the blocking plunger **34** will be released from the pawl or lever **51**. After a short period of time of resumption of current flow in the electric circuit to the heat motor plunger **34** may, after opening door **12**, be manually pushed by the user of the refrigerator cabinet back into its "cocked" position shown in Figure 3 of the drawings to permit the door to be opened and closed in the usual manner during use of the refrigerator to preserve foods therein. If however, the detachable cord of the electric circuit is disconnected from the source of current supply with the intention of discarding or abandoning the refrigerator cabinet and the cabinet is dumped at a junk yard or dumping ground the danger of a child becoming trapped therein is eliminated by the door blocking arrangement herein disclosed. Moreover, my invention insures that a small younger child, incapable of overcoming the weight of a door, such as door **12**, and raising same upon becoming trapped in a cabinet lying on its back, as shown in Figure 2 of the drawings, in a junk yard or dumping ground will not be suffocated in the compartment or chamber **11** thereof. The blocking device is rendered operative to block the refrigerator cabinet door upon opening the door after the electric circuit to the cabinet has been interrupted. Thus should a refrigerator cabinet having my invention incorporated therein be discarded and thrown on a dump, without some one opening the door after the electric circuit to the cabinet has been disconnected, the act of a child opening a latched shut door renders the blocking device effective to prevent closing the door and consequently the child upon entering the compartment of the refrigerator cabinet may breathe freely therein, to prevent his or her becoming suffocated, and the child can, if unable to escape unassisted from the compartment, therefore cry out for help. Since my device positively blocks the refrigerator cabinet door open the act of other or older children playfully or mischievously placing large objects against or upon the door, in an attempt to prevent the escape of a small younger child trapped in the cabinet, cannot tightly close the door and the trapped child will not be suffocated.

It should be apparent that I have provided an improved apparatus which overcomes a nation-wide hazard regardless of the position that a discarded refrigerator cabinet may come to rest in a dump or junk yard. My invention eliminates the possibility of children losing their lives in abandoned or junked refrigerator cabinets irrespective of negligence on the part of persons discarding old cabinets and forgetting to remove certain parts therefrom. My improvement, in addition to meeting strict requirements of laws and ordinances now being drafted, obviates the expense of altering or modifying the construction and operation of present day refrigerator cabinet door latching mechanisms in order to provide a safety device therein or thereon and could readily be applied to refrigerator cabinets in storage and not yet sold or installed in territories where such laws may be in effect.

While the form of embodiment of the invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted as may come within the scope of the claim which follows.

What is claimed is as follows:

In a refrigerator, a cabinet structure having a compartment therein provided with an access opening and a door structure for closing the opening, a refrigerating system associated with said cabinet including an evaporator for cooling said compartment and an electrically operated refrigerant translating unit, an electric circuit detachably connected to a source of electric current leading therefrom to said unit, a door blocking element on one of said structures and movable therewith upon transporting the refrigerator from one locality to another, a first spring associated with said blocking element biasing same toward a door blocking position, a shiftable lock for the door blocking element having one part adapted to engage a first portion of said element and another part adapted to engage a second portion of said element opposed to said first portion thereof, a second spring associated with and adapted to act on said lock, a temperature responsive means in said circuit energized thereby overcoming said second spring to hold said one part of the lock in engagement with said first portion of said blocking element whereby to render said first spring ineffective and to cock said element out of door blocking position, a manually actuated latch mechanism separate from and operable independently of said blocking element maintaining said door closed upon temporary interruptions in current to said electric source, said temperature responsive means being deenergized by disconnecting said detachable circuit from its source of electric current for rendering said second spring effective to shift said lock and disengage said one part thereof from said first portion of the blocking element to uncock same and render said first spring effective, said first spring moving said element, in response to an opening movement of said door by operating said latch mechanism, into a position to be engaged by the door for blocking same open ajar with respect to said cabinet to form a gap therebetween for circulation of air ambient the cabinet into said compartment, and said second spring simultaneously shifting said lock to move said another part thereof into engagement with said second portion of said blocking element to provide a rigid backing therefor preventing force applied to the door, while it is blocked open, from closing the gap between said structures.

References Cited in the file of this patent

UNITED STATES PATENTS

1,271,363	Ralston	July 2, 1918
1,547,999	Farabough	July 28, 1925
1,958,940	Cavanaugh et al.	May 15, 1934
2,105,350	Fitz Gerald	Jan. 11, 1938
2,636,762	Jameson	Apr. 28, 1953
2,733,576	Knock	Feb. 7, 1956
2,767,011	Buckley	Oct. 16, 1956