June 22, 1937.

E. R. GILL, SR

2,084,730

REFRIGERATING SYSTEM

Original Filed May 7, 1930

2 Sheets-Sheet 1

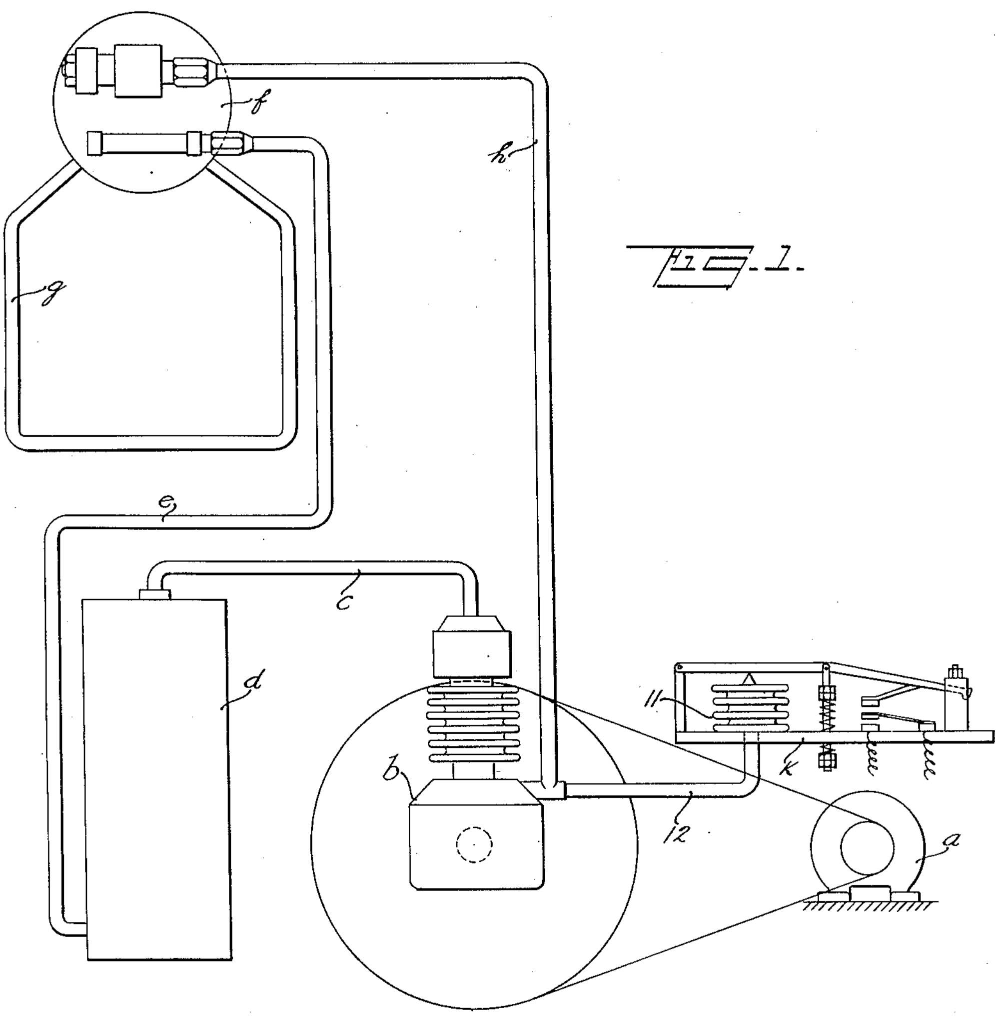

Fig. 1.

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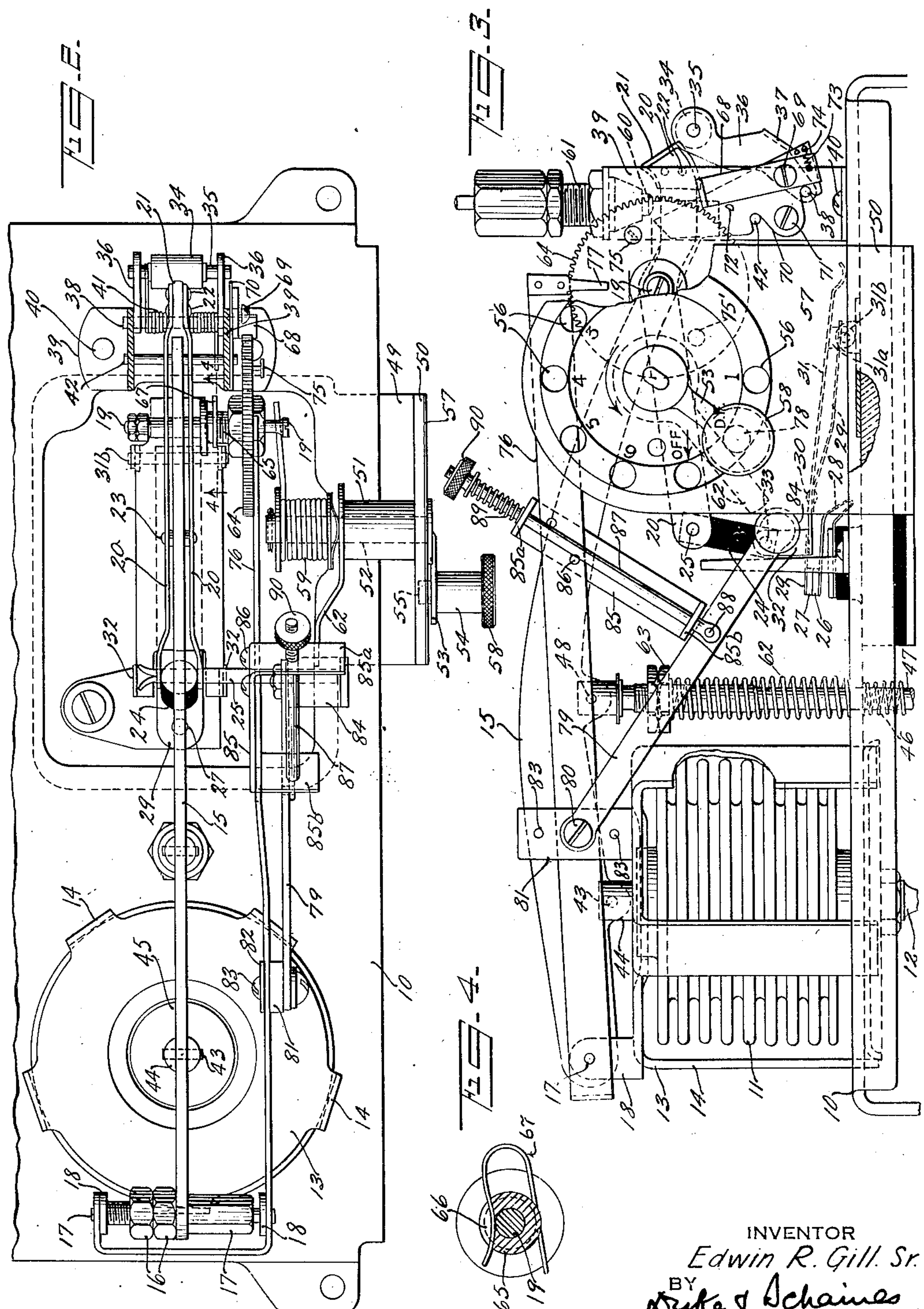

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Patented June 22, 1937 2,084,730

UNITED STATES PATENT OFFICE

2,084,730

REFRIGERATING SYSTEM

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Application May 7, 1930, Serial No. 450,451
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29 Claims. (Cl. 62—4)

My invention relates to refrigerating systems of the type employing a volatile refrigerant which at the higher range of temperature is a gas or vapor and at the lower range a liquid, for example, sulphur dioxide, and includes as equivalents refrigerants of the ammonia type.

In systems of the above type or types the refrigerant is converted to liquid phase and introduced into a vessel generally known as an evaporator which is in heat exchange relation with a body to be refrigerated. Here the refrigerant is permitted to vaporize, the gas or vapor being periodically conveyed away from the vaporizing region and recondensed. Such a process is generally cyclic, and as ordinarily practiced in household apparatus is discontinuous, in that the liquefaction step is brought about automatically by a suitable heat-responsive control whenever the temperature of the refrigerated region rises to a given point, for example 28° F. The compressor, if the system be of the compressor type, is thereupon set into operation by an electric motor to draw the vapor from the region of refrigeration and condense it to a liquid, thereby causing a lowering of the temperature of such region. This step of the cycle continues until the temperature has been lowered to a predetermined degree, for example, 8° F. whereupon the motor circuit is opened and the compressor stops.

The temperature and pressure of the refrigerant then gradually rise until the temperature is at the figure previously mentioned, viz, 28° F., whereupon another cycle of operation is initiated as before described.

As heretofore practiced, such cycles automatically succeed each other without any attention on the part of the user. However, on account of the presence of moisture in the refrigerated region, a deposit of ice or frost gradually accumulates upon the evaporator or cooling pipes which increases in thickness until the efficiency of the system is seriously impaired and it then becomes necessary to defrost the pipes.

This is ordinarily accomplished by the use of a hand operated switch or other device which prevents the closing of the motor circuit, so that compression does not begin until the temperature of the refrigerated region has risen sufficiently above 32° F. to cause a melting of the frost on the pipes. The hand device is then shifted to permit the resumption of the cycles heretofore described.

It has also been proposed to make use of devices which may be set by hand for varying the normal cycle by preventing the closing of the motor circuit until the temperature of the refrigerated region has risen sufficiently to cause defrosting, and after such cycle the part so set by hand is automatically restored to initial position so that the normal cycles follow each other until the hand device is again operated.

In all of the above systems defrosting is accomplished only when some device is moved or operated by the user. In case the user does not pay proper attention to the apparatus so as to cause defrosting of the cooling pipes, the system becomes inefficient by reason of the heat insulating effect of the frost on the pipes, the compressor must be driven more than would be necessary with defrosted pipes, and unnecessary expense results.

In accordance with another system the upper limit of temperature of each cycle is sufficiently high to cause defrosting during each cycle. The disadvantage of such system is inefficiency due to the fact that the compressor, after being started at the high temperature must be operated for a much longer time than when started at a lower temperature in order to bring the refrigerated region to the desired low temperature which constitutes the lower limit.

It has also been proposed to automatically defrost by a device which is unitary with the normal control. The particular construction I refer to is impractical because the defrosting mechanism is in no sense separate and cannot be adapted to varying conditions.

It has also been proposed to defrost an evaporator by periodically heating it by an electric heater. This system is not practical and is disadvantageous on account of the electrical equipment in the compartment to be refrigerated and the heat thereby introduced.

According to my invention, defrosting is accomplished by automatically varying cycles from normal or introducing certain modifications of control whereby the temperature of the evaporator automatically rises above the normal operating range and to above frosting temperature at certain times. This is accomplished in the preferred form by imposing an additional resistance on the pressure-responsive member of the energy supply control means at recurring intervals between a plurality of normal cycles or at given intervals. Preferably, a counting device is used which is actuated by cyclic movement of the energy supply means to count cycles, after a given number of which the additional resistance is imposed.

My invention will become clear by reference to the following specification taken in conjunction with the accompanying drawings, forming part of this specification.

Among the objects of my invention are: To provide a practical fully automatic defrosting mechanism; to provide a defrosting mechanism which is adaptable to varying conditions; to provide a fully automatic defrosting mechanism which may be separately adjusted with respect to the normal control apparatus and which may be rendered ineffective for certain purposes.

My invention is capable of many variations, some of which are illustrated in the accompanying drawings, of which

Fig. 1 is a diagrammatic view of a refrigerating system in which my invention is employed.

Figure 2 is a plan and

Fig. 3 is a side elevation of one form of defrosting regulator suitable for use in carrying out my invention.

Fig. 4 is a section on line 4—4 of Fig. 2.

The system of Fig. 1 is well known and comprises an electric motor *a* for operating a compressor *b*, for compressing a volatile refrigerant, for example sulphur dioxide. A pipe *c* connects the high pressure side of the compressor with the condenser *d* where it is liquefied. The liquid is forced through pipe *e* to the valve *f* for controlling escape of liquid to the low pressure side of the system, after which the refrigerant is permitted to enter the cooling pipes or units *g* in the region which is to be refrigerated. Evaporation of the refrigerant takes place and the vapor is drawn through pipe *h* to the low pressure side of the compressor *b* to complete the cycle.

A pipe **12** connects pipe *h* with the metal bellows **11** of the switch *k* for closing and opening the power circuit of the electric motor *a* and thereby starting and stopping the motor and the compressor.

One form of defrosting regulator is shown in Figs. 2 and 3. This regulator is here combined with a well known type of electric switch for controlling the closing and opening of the power circuit of the electric motor which drives the compressor.

The switch shown comprises a base or body **10**, upon which is mounted a metal bellows **11**, the ends of which are closed except for the pipe **12** which is connected to the low pressure side of the system. A spider **13** comprising an apertured top plate and depending arms **14** is secured to the base and limits the expansion of the bellows.

The main switch arm **15** is clamped by lock nuts **16** against the shoulder formed by an enlarged part of the pivot pin **17** which is journaled in ears **18** integral with the spider **13**. The free end of the switch arm **15** is provided with a horizontal pin **19** upon which are journaled a pair of arms **20**. These arms are united at one end by a hardened metal wear block **21** and rivets **22** and intermediate their ends by rivet **23**. The other ends of said arms are spread to receive an insulator **24** which turns freely on a rod **25** fixed to the arms.

The switch also comprises contacts **26** and **27**. The contact **26** is fixed to the free end of a flat spring **28** which is secured to the body. The contact **27** is fixed to the free end of a flat spring **29** which is secured by rivet **30** to a plate **31**. The plate **31** is provided with integral ears **32** which carry a pivot pin **33** upon which the insulator **24** is loosely mounted. The plate **31** also has depending lugs **31**[a] which are journaled on a pin **31**[b] fixed to the body.

A roller **34** is mounted on a pin **35** which is journaled in the upper ends of side plates **36** of a support **37**. The lower ends of the side plates are rotatable on a pin **38** and the latter is rigidly mounted in the standards **39** which are secured to the base by rivets **40**. A coil spring **41** surrounds the pin **38**, one end bearing against the rod **42** and the other against the support **37**, whereby the roller **34** is urged toward the left, Fig. 3, and against the wear block **21**.

The switch arm **15** is connected by pivot pin **43** with a stud **44** which is fixed to the upper wall **45** of the metal bellows **11**.

The parts hereinbefore mentioned operate briefly as follows: Assuming the switch to be in open circuit position, the compressor is not working and the pressure on the low pressure side of the system is rising. When the temperature of the region surrounding the cooling units rises to approximately 28° F. the pressure of the refrigerant causes the bellows **11** to expand sufficiently to raise the arm **15** into the position of Fig. 3, the roller **34** pressing strongly against the wear block **21** and closing the switch, whereupon the electric motor is started and the compressor operated thereby.

By varying the resistance of the arm **15** to upward movement, the degree of temperature at which the switch closes the motor circuit can be either raised or lowered. This is ordinarily accomplished by adjustment springs as shown. The circuit closing temperature may be raised by increasing the resistance to compression of the spring **46** which surrounds the rod **47** and bears against the base and a nut (not shown) threaded thereon. The rod passes through an opening in the base and is pivoted at **48** to the arm **15**.

This means provides for the closing of the circuit under ordinary running conditions, as when the temperature is to be allowed to rise as high as 28° F. In case it is desired to lower this limit for the purpose of running at a lower average temperature such result may be accomplished by the following means.

A plate **49** having a standard **50** is secured to the body. The standard is provided with a bearing **51** within which is journaled a shaft **52**. An operating arm **53** is rigid with the outer end of said shaft and carries at its free end a sleeve **54** and sliding detent or bolt **55** which is adapted to engage any one of a series of holes **56** formed in and extending through the standard **50** and dial plate **57**. The knurled knob **58** is rigid with the bolt **55** and the same are normally held in the position shown by a spring within the sleeve **54**.

Upon the inner end of the shaft **52** is a coil spring **59**, one end of which is pinned through the shaft and the other extends outward therefrom as shown in Fig. 2. When the bolt **55** is in the hole **1** of the dial, which provides for ordinary or average running conditions, the spring **59** is inactive. Upon moving the arm **53** in a counterclockwise direction to one of the holes **3** to **6** inclusive of the dial the free end of the spring **59** is caused to press against the lower surface of the shaft **19** with a pressure which increases as the arm moves toward the hole **6**.

Such pressure upon the shaft **19** aids the bellows in elevating the switch arm **15** to close the motor circuit, and consequently lowers the upper limit or range of the working temperature of the system, each hole from **3** to **6** providing for a definite and progressively lower temperature, the values of which may be definitely regulated within certain limits by means of a spring pressed pin 60, which yieldingly opposes the upward movement of the end of the arm 15. Such pin is mounted in a vertically adjustable holder 61.

Upon moving the arm 53 so as to engage the bolt 55 in the dial hole marked "Off" an arm 62 which is rigid with shaft 52 is brought into a position directly below the pin 25 and locked against movement. The pin 25 is therefore unable to descend and consequently the contact 27 is held in an elevated position and the motor circuit cannot be closed.

As the compressor operates, the pressure is lowered in the evaporator and consequently in bellows 11. When the pressure decreases to a value corresponding to the low limit of temperature, the downward pressure on arm 15 overcomes the spring pressed roller 34 and the switch is snapped open.

The lower limit or range of working temperature may be varied by means of the adjustable coil spring 62'. The ends of this spring abut respectively against the base 10 and lock nut 63. Inasmuch as this spring tends to move the switch arm 15 upward, a movement of the lock nut downward increases the upward urge of the spring and makes it more difficult for the bellows to pull the switch arm down to open the motor circuit. The compressor therefore operates to produce a lower pressure on the low pressure side of the system and a correspondingly lower temperature in the refrigerated region before the motor circuit can be opened.

All of the switch control mechanism of Figs. 2 and 3 described up to this point is well known and in use and has been set forth in order to show how my invention may be applied as an attachment thereto, so that the advantages thereof may be obtained without the necessity of substituting therefor a different switch.

In applying my invention to the foregoing type of apparatus, I prefer to bring about a defrosting operation periodically and automatically by means of a cycle counting mechanism and means which at the end of any desired number of cycles, by cooperating therewith will alter a normal cycle by increasing the resistance of the switch arm 15 to upward motion, so that the motor circuit cannot be closed until the pressure of the refrigerant vapor is sufficiently high to produce a defrosting temperature, for example 36° F. One such cycle is ordinarily sufficient for this purpose, but if desired two or even more cycles may be thus altered, after which the normal mode of operation is automatically resumed.

The cycle counting device comprises a toothed wheel 64 carried by a sleeve or hub 65 which is rotatable on the pin 19. A slot 66 extends through said hub, and a U shaped spring 67 is mounted on the hub with one arm in said slot so as to frictionally engage the pin 19, and prevent the hub from spinning thereon.

Inasmuch as the pin 19 is carried by the switch arm 15, the toothed wheel 64 moves up and down with said arm. There is a pawl 68 pivoted on the screw 69, the latter being threaded in a plate 70 which is secured to the standard 39 by a screw 71. This plate has a stop 72 against which the pawl 68 is normally pressed by a spring 73. One end of said spring is held in an opening 74 in plate 70, and the other in an opening in the free end of the pawl.

As the switch arm 15 descends to open the motor circuit at the end of each cycle, the toothed wheel 64 is moved in a counterclockwise direction the distance from one tooth to the next by reason of the engagement of a tooth with the pawl 68. As the switch arm ascends to close the motor circuit the wheel rides over the pawl without turning. In case the wheel has 60 teeth, it will make one complete rotation for every 60 cycles of operation of the refrigerating system, or 60 closings and openings of the motor switch.

The wheel 64 is provided with a horizontal stud 75 which cooperates with a lever 76 to increase the resistance to upward movement of switch arm 15 by which the motor circuit is closed, whereby the temperature of the refrigerant on the low pressure side of the system must rise to a defrosting temperature for at least one cycle of operation out of the total number which correspond to the total number of teeth on the wheel.

The lever 76 is bent at one end to form a yoke or U which is journaled on the pin 17. The free end of said lever has a depending tooth 77 in position to be engaged by stud 75 as will be described.

Upward movement of the lever 76 is opposed by the following means. A hole 78 is formed in the dial plate 57 and support 50 to receive the bolt 55 of arm 53 and when so situated the arm 62 is in the position shown in Fig. 3. There is a rod 79 which is pivoted at one end on a screw 80 threaded in a block 81, and the latter is clamped upon the lever 76 by means of a plate 82 and headed screws 83. The block 81 normally rests upon the spider 13 as shown and supports the lever 76. Upon the lower end of the rod 79 is a roller 84, upward movement of which is prevented by arm 62 when in the position shown.

A U-shaped plate 85 having an upper arm 85ª and a lower arm 85ᵇ is secured to the lever 76 by headed screws 86 and its upper and lower arms are slidable upon a rod 87 which is pivotally mounted on a pin 88 carried by rod 79.

By reason of such slidable connection, the free end of lever 76 is capable of upward movement with respect to the rod 79 and roller 84. Such movement however is resisted by a coil spring 89, the ends of which abut respectively against the upper surface of arm 85ª and the adjusting nut 90 which is threaded upon the upper end of rod 87. The degree of such resistance may be varied by movement of said nut to vary the compression of said spring.

Whenever the bolt 55 and arm 62 of the control arm 53 are in the position shown, a defrosting cycle will be automatically and regularly interposed within a series of normal or non-defrosting cycles of operation of the refrigerating system, as follows:

The succession of normal cycles causes a step by step movement of the toothed wheel 64 until the stud 75 is brought immediately below the point or end of the tooth 77 of lever 76. At the next upward movement of the switch arm 15 brought about by the bellows 11 for the purpose of closing the motor switch to start the motor and drive the compressor, the toothed wheel is carried upward by the pin 19 on which it is mounted and the stud 75 engages the end of the tooth 77 and elevates the free end of the lever 76. The free end of rod 79 however, cannot rise on account of the arm 62 being in the path of the roller 84. Consequently the plate 85 must slide upon the rod 87 against the resistance of the spring 89. Such resistance is additional or supplementary to the resistance of the spring 46 which also opposes the upward movement of switch arm 15, and the effect of such added resistance is to keep the motor circuit open until the refrigerated region attains a temperature sufficiently higher than the normal upper range or limit to cause defrosting of the cooling pipes, for example 36° F.

When such temperature is reached the pressure of the vapor in the bellows 11 is sufficient to raise the switch arm and close the motor circuit. The motor thereupon starts and drives the compressor until the temperature is brought down to the normal lower limit, whereupon the contraction of the bellows causes a downward movement of the switch arm 15 and toothed wheel 64. Such movement causes engagement of a tooth thereof with the pawl 68 and advances the wheel the pitch distance thereof which brings the stud 75 from under the tooth 77 and restores the sequence of normal cycles until the toothed wheel has made another revolution.

By moving arm 53 so that bolt 55 enters a hole other than that shown, for example, to obtain a lower upper temperature limit, arm 62 is moved away from contactive relation with roller 84 and the defrosting mechanism is rendered ineffective.

Obviously the proportion of defrosting cycles to normal cycles may be varied in different ways as, for instance, by varying the number of teeth upon the wheel 64, or by adding one or more additional studs 75 thereto, as indicated at 75', Fig. 3, or by increasing the width of the tooth 77 or of the shank of stud 75 so that more than one downward movement of the wheel will be necessary in order to effect a clearance of the stud with respect to the tooth.

While I have illustrated my invention in one of its preferred forms as an attachment to the control switch of a well known household refrigerating system, the invention is not limited thereto and may be applied in many different ways to a cyclic refrigerating system of the type described.

I claim:

1. In a refrigerating system, the combination of a compressor for compressing a gas or vapor, electrical means comprising an electric circuit for actuating said compressor, means responsive to a normal low temperature limit for opening said circuit, means responsive to a normal high temperature limit for closing said circuit, separate resilient means opposing the action of said last named means to cause it to respond to a higher closing temperature, and means for automatically bringing said opposing means into and out of action.

2. In a refrigerating system, the combination of a compressor for compressing a gas or vapor, an electric motor for driving the compressor and a power circuit for actuating the motor, means including a first spring responsive to the normal upper temperature limit of the refrigerated region for closing said circuit and means including a second spring for automatically and temporarily causing said means to respond only to a higher temperature to effect a defrosting operation.

3. An attachment for the electric circuit closing switch of a cyclic refrigerating system, said switch comprising a pivotal switch arm and a first spring for causing the closing and opening of the circuit, said attachment comprising a toothed wheel to be mounted on said switch arm, a pawl for engagement with the teeth of said wheel for imparting a step by step movement thereto, and means cooperating with said wheel comprising a separate pivoted arm and a second spring for periodically increasing the resistance of said switch arm to movement for closing the circuit.

4. An attachment for the electric circuit closing switch of a cyclic refrigerating system, which switch comprises a pivotal switch arm for causing the closing and opening of the circuit, said attachment comprising means for counting the movements of said switch arm, and means including a second pivoted arm and a spring for periodically increasing the resistance of said switch arm to movement for closing the circuit.

5. Control mechanism for a refrigerating system comprising a flexible pressure-responsive member, an electric switch, means actuated by said flexible member for closing and opening said switch, resistance means exerting force in opposition to pressure exerted against said flexible member, separate resistance means adapted to exert an additional force against said flexible member, and means controlled by movement of said flexible member operating to cause said additional force-exerting means to act periodically between a plurality of cycles of closing and opening of said switch.

6. Control mechanism for a refrigerating system comprising a flexible pressure-responsive member, an electric switch, means actuated by said flexible member for closing and opening said switch, resistance means exerting force in opposition to pressure exerted against said flexible member, separate resistance means adapted to exert an additional force against said flexible member, and means controlled by movement of said flexible member operating to cause said additional force-exerting means to act periodically between a plurality of numbered cycles of closing and opening of said switch, said resistance means being separately adjustable.

7. Control mechanism for a refrigerating system comprising a flexible pressure-responsive member, an electric switch, means actuated by said flexible member for closing and opening said switch, a normally acting spring exerting force in opposition to pressure exerted against said flexible member, a second spring adapted to exert an additional force against said flexible member, and means controlled by movement of said flexible member operating to cause said second spring to act periodically between a plurality of cycles of closing and opening of said switch

8. Control mechanism for a refrigerating system comprising a flexible pressure-responsive member, an energy supply control member, means actuated by said flexible member for actuating said control member, resistance means exerting force in opposition to pressure exerted against said flexible member, separate resistance means adapted to exert an additional force against said flexible member, and means controlled by movement of said flexible member operating to cause said additional force-exerting means to act automatically at intervals.

9. Control mechanism for a refrigerating system comprising a flexible pressure-responsive member, an energy supply control member, means actuated by said flexible member for actuating said control member, resistance means exerting force in opposition to pressure exerted against said flexible member, separate resistance means adapted to exert an additional force against said flexible member, and means con-

trolled by movement of said flexible member operating to cause said additional force-exerting means to automatically act periodically between a numbered plurality of cycles of actuation of said control member.

10. Control mechanism for a refrigerating system comprising a flexible pressure-responsive member an energy supply control member, means actuated by said flexible member for actuating said control member, a normally acting spring exerting force in opposition to pressure exerted against said flexible member, a second spring adapted to exert an additional force against said flexible member, means controlled by movement of said flexible member operating to cause said second spring to act automatically at predetermined intervals and means for separately adjusting the force of said springs.

11. Control mechanism for a refrigerating system comprising a flexible pressure-responsive member, an electric switch, means actuated by said flexible member for closing and opening said switch, resistance means exerting force in opposition to pressure exerted against said flexible member, separate resistance means adapted to exert an additional force against said flexible member, and pawl and ratchet mechanism controlled by movement of said flexible member operating to cause said additional force-exerting means to act periodically between a plurality of cycles of closing and opening of said switch.

12. A refrigerating system comprising means to supply energy thereto, means for controlling the supply of energy, and means for controlling the last-mentioned means comprising a normally operative member responsive to variations in temperature below an upper limit of temperature, defrosting mechanism movable to periodically restrain the energy supply and to restore the supply of energy in response to temperature above said upper limit of temperature, and manually operable means to cause said normally operative member to be responsive to a lower upper limit of temperature and to simultaneously render the defrosting mechanism ineffective.

13. A refrigerating system comprising means to supply energy thereto, means for controlling the supply of energy, and means for controlling the last-mentioned means comprising a normally operative member responsive to variations in temperature below an upper limit of temperature and spring means acting against said member, defrosting mechanism movable to periodically increase the spring resistance on said member to restrain the energy supply and to restore the supply of energy in response to temperature above said upper limit of temperature, and manually operable means for decreasing the spring resistance on said normally operative member to cause said member to be responsive to a lower upper limit of temperature and for simultaneously rendering the defrosting mechanism ineffective.

14. A refrigerating system comprising means to supply energy thereto, means for controlling the supply of energy, and means for controlling the last-mentioned means comprising a normally operative member responsive to variations in temperature below an upper limit of temperature, defrosting mechanism movable to periodically restrain the energy supply and to restore the supply of energy in response to temperature above said upper limit of temperature, manually operable means to cause said normally operative member to be responsive to a lower upper limit of temperature, and means to render the defrosting mechanism ineffective.

15. A refrigerating system comprising means to supply energy thereto, means for controlling the supply of energy, and means for controlling the last-mentioned means comprising a normally operative member responsive to variations in temperature below an upper limit of temperature, defrosting mechanism movable step-by-step to periodically restrain the energy supply and to restore the supply of energy in response to temperature above said upper limit of temperature, and manually operable means to cause said normally operative member to be responsive to a lower upper limit of temperature and to simultaneously render the defrosting mechanism ineffective.

16. Control mechanism for a refrigerating system including flexible pressure-responsive means, energy supply control means, means actuated by said flexible means for actuating said control means, resistance means exerting force in opposition to pressure exerted against said flexible means, separate resistance means adapted to exert an additional force against said flexible means, and means to cause said additional force-exerting means to act automatically at predetermined intervals.

17. Control mechanism for a refrigerating system including flexible pressure-responsive means, energy supply control means, means actuated by said flexible means for actuating said control means, resistance means exerting force in opposition to pressure exerted against said flexible means, separate resistance means adapted to exert an additional force against said flexible means and means to cause said additional force-exerting means to act periodically, said resistance means being separately adjustable.

18. A refrigerating system comprising means to supply energy thereto, means for controlling the supply of energy, and means for controlling the last-mentioned means comprising a normally operative member responsive to variations in temperature below an upper limit of temperature, defrosting mechanism automatically movable to periodically restrain the energy supply and to automatically restore the supply of energy, and manually operable means to cause said normally operative member to be responsive to a lower upper limit of temperature and to simultaneously render the defrosting mechanism ineffective.

19. A refrigerating system comprising means to supply energy thereto, means for controlling the supply of energy, and means for controlling the last-mentioned means comprising a normally operative member responsive to variations in temperature below an upper limit of temperature and spring means acting against said member, defrosting mechanism automatically movable to periodically increase the spring resistance on said member to restrain the energy supply and to automatically restore the supply of energy, and manually operable means for decreasing the spring resistance on said normally operative member to cause said member to be responsive to a lower upper limit of temperature and for simultaneously rendering the defrosting mechanism ineffective.

20. A refrigerating system comprising means to supply energy thereto, means for controlling the supply of energy, and means for controlling the last-mentioned means comprising a normally operative member responsive to variations in

temperature below an upper limit of temperature, defrosting mechanism automatically movable step by step by said control means to a position to periodically restrain the energy supply and to automatically restore the supply of energy, normally operative means to cause said normally operative member to be responsive to a lower upper limit of temperature, and means independent of the presence or absence of frost for preventing the operation of said defrosting mechanism to operate as a defrosting means when in its defrosting position.

21. A refrigerating system comprising means to supply energy thereto, means for controlling the supply of energy, and means for controlling the last-mentioned means comprising a normally operative member responsive to variations in temperature below an upper limit of temperature, defrosting mechanism automatically movable step-by-step to periodically restrain the energy supply and to automatically restore the supply of energy, and manually operable means to cause said normally operative member to be responsive to a lower upper limit of temperature and to simultaneously render the defrosting mechanism ineffective.

22. A refrigerating system comprising means to supply energy thereto, means for controlling the supply of energy, and means for controlling the last-mentioned means comprising a normally operative member responsive to variations in temperature below a given temperature, defrosting mechanism movable by one of said control means to periodically restrain the energy supply and to restore the supply of energy, and means independent of the presence or absence of frost for preventing the operation of said defrosting mechanism.

23. Control mechanism for a refrigerating system including normally active resilient mechanism responsive to variations in temperature of an object to be cooled and movable to vary supply of energy to maintain a predetermined condition of refrigeration, normally inactive resilient mechanism, means to intermittently and automatically activate the second-mentioned mechanism to take over control of energy supply so as to cause defrosting, means to automatically restore the second-mentioned mechanism to inactive condition, and means to simultaneously adjust the first-mentioned mechanism to different temperature and render the second-mentioned mechanism ineffective.

24. In a refrigerating system, a cooling element, a first means normally controlling the operation of the system to maintain the temperature of the cooling element at a predetermined normal value, a second means for modifying operation of the system to allow the temperature of said cooling element to rise above said normal value, and an automatic intermittent actuator operated by said first means for instigating operation of said second means, said second means being automatically rendered ineffective to so modify the operation upon a predetermined drop in temperature of said cooling element below said normal value.

25. Refrigerating apparatus comprising an evaporator, means for circulating a refrigerating medium through the evaporator, means for controlling the operation of the refrigerating apparatus to maintain the temperature of the evaporator substantially constant, said control means including adjusting means to obtain a different temperature in said evaporator, automatic means for defrosting said evaporator, and means operated by said control means for preventing the operation of said defrosting means.

26. Refrigerating apparatus comprising an evaporator, means for circulating a refrigerating medium through the evaporator, means for controlling the operation of the refrigerating apparatus to maintain the temperature of the evaporator substantially constant, means for adjusting said control means to obtain a lower temperature in said evaporator, automatic means for defrosting said evaporator, and means operated by said adjusting means for preventing the operation of said defrosting means.

27. Refrigerating apparatus comprising an evaporator, means for circulating a refrigerating medium through the evaporator, means for controlling the operation of the refrigerating apparatus to maintain the temperature of the evaporator substantially constant, means for adjusting said control means to a plurality of selective positions to obtain a plurality of different temperatures in said evaporator, automatic means for defrosting said evaporator, and means operated by the movement of said adjusting means to at least one of the selective positions to prevent the operation of said defrosting means.

28. Refrigerating apparatus comprising an evaporator, means for circulating a refrigerating medium through the evaporator, a switch for controlling the operation of the refrigerating apparatus to maintain the temperature of the evaporator substantially constant, said switch being provided with a plurality of selective adjustable positions to maintain the temperature of the evaporator at the selected temperatures, automatic means for defrosting the evaporator, and means operated by the movement of the switch to at least one of the selected positions to prevent the operation of said defrosting means.

29. A refrigerating system comprising means to supply energy thereto, means for controlling the supply of energy, and means for controlling the last-mentioned means comprising a normally operative member responsive to variations in temperature below a given temperature, defrosting mechanism, and means independent of the presence or absence of frost for operating said defrosting mechanism to periodically restrain the energy supply and to restore the supply of energy in response to temperature above said given temperature, and means to render said defrosting mechanism ineffective.

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