

No. 716,480.

Patented Dec. 23, 1902.

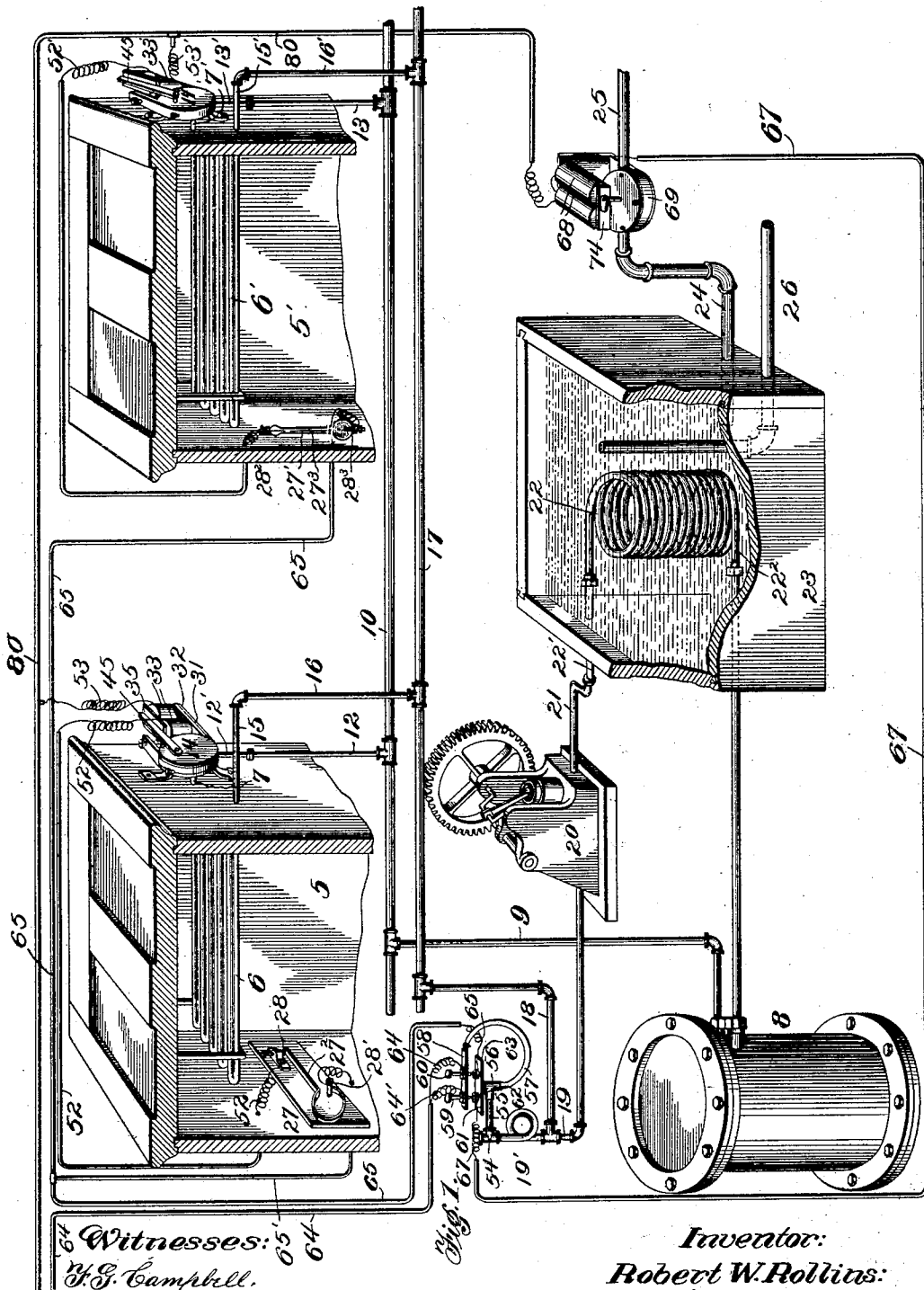
R. W. ROLLINS.

REGULATING APPARATUS FOR REFRIGERATING COMPARTMENTS.

(Application filed Aug. 12, 1901.)

(No Model.)

3 Sheets—Sheet 1.



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3 Sheets—Sheet 2.

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Fig. 2.

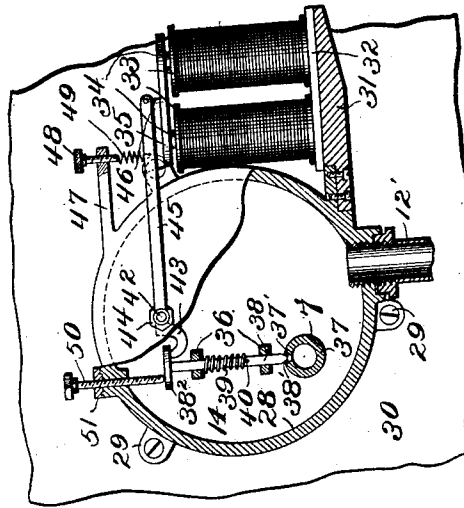
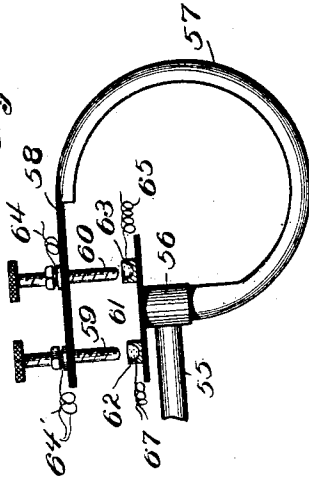


Fig. 5.

Fig. 3.

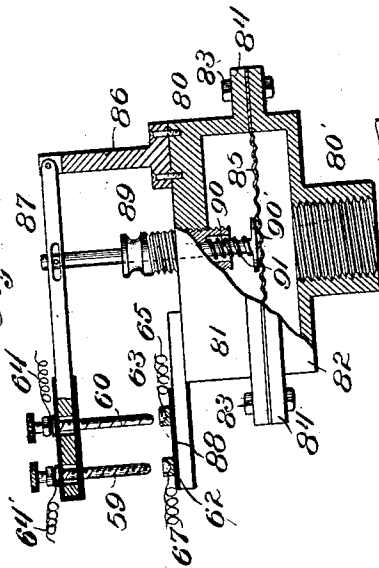
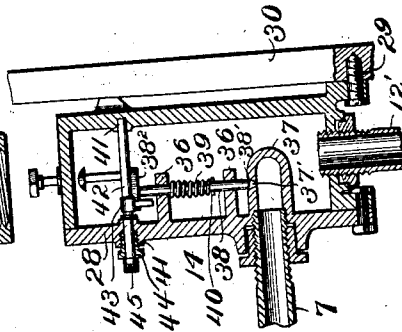


Fig. 4.



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3 Sheets—Sheet 3.

Fig. 6.

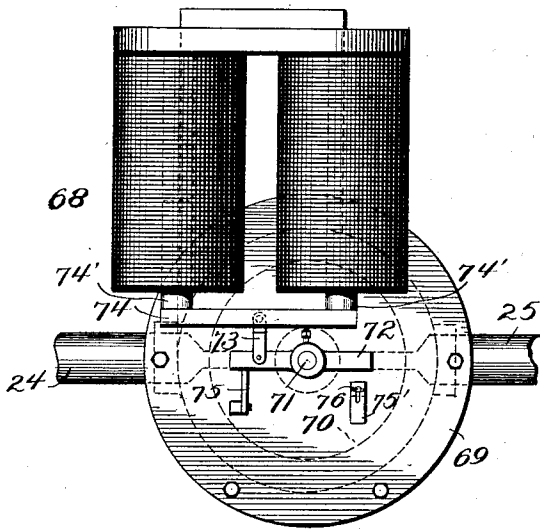


Fig. 7.

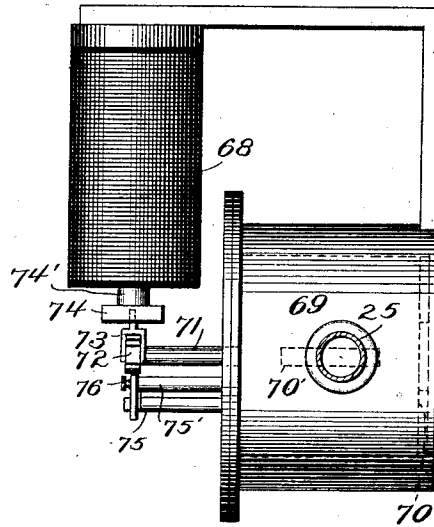


Fig. 8.

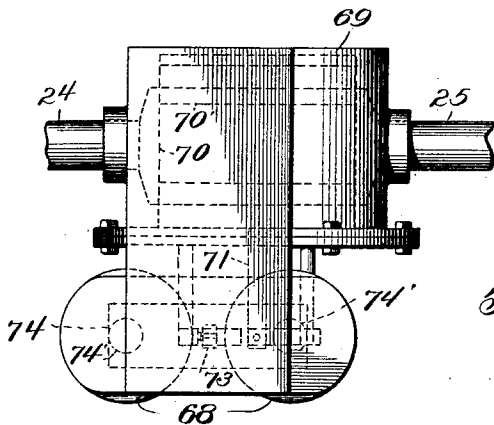


Fig. 9.

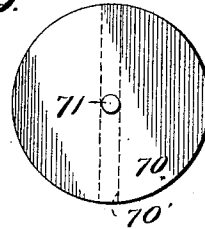
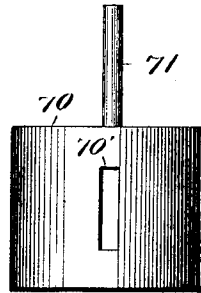


Fig. 10.



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UNITED STATES PATENT OFFICE.

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REGULATING APPARATUS FOR REFRIGERATING-COMPARTMENTS.

SPECIFICATION forming part of Letters Patent No. 716,480, dated December 23, 1902.

Application filed August 12, 1901. Serial No. 71,730. (No model.)

To all whom it may concern:

Be it known that I, ROBERT W. ROLLINS, a citizen of the United States, residing in Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Regulating Apparatus for Refrigerating-Compartments, of which the following is a specification.

My invention relates to regulating apparatus for refrigerating-compartments in which it may be desired to produce ice artificially or to store food and other materials for purposes of preservation.

Mainly the object of my invention is the provision in a refrigerating plant of automatic regulating devices which will serve to control the admission of refrigerating liquid to the coils or other expansion-chambers within the refrigerating-compartments in which said liquid vaporizes to lower the temperature.

A further object of the invention is the provision of an automatic regulator operated by back pressure within the expansion-coils and serving when actuated in this manner to close the inlet valve or valves.

A further object of the invention is the provision of means for shutting off the water-supply from the main or other source of pressure, and thereby saving waste of water used for condensing the anhydrous ammonia-gas or other liquid employed when the conditions are such as to warrant it.

A further object of the invention is the provision of electrical devices controlled by a thermostat or thermostats and also by an automatic back-pressure regulator for closing the inlet-valve to the expansion-chamber, said regulator also controlling a valve leading to the pipe which supplies water to the chamber in which the condensing-coil is located.

Referring to the accompanying drawings, Figure 1 is a perspective representation of a refrigerating plant involving the details of my invention. Fig. 2 is a side elevation, detached, of an automatic regulator operative by back pressure within the expansion-coils and pipe system. Fig. 3 is a view of a modified form of said regulator. Fig. 4 is a longitudinal vertical section of a valve-chamber connected with the expansion coil or chamber. Fig. 5 is a transverse vertical section

of said valve-chamber, showing the magnets in elevation. Figs. 6, 7, and 8 are detail views of the means employed for opening and closing the conduit leading from the pump for supplying water to the compartment in which the vapor-condensing coil is located. Figs. 9 and 10 are respectively plan and side views of a valve employed in a chamber of the conduit leading to the pump.

Like numerals designate similar parts throughout the several views.

Referring to the drawings, the numerals 5 and 5' designate refrigerating-compartments of any desired kind, form, size, or proportions, and the numerals 6 and 6', respectively, refrigerating or expansion coils, (hereinafter termed "expansion-chambers,") which are located in the illustrations given at the tops of the compartments, although they may be differently disposed without departure from the invention. These coils are shown as horizontally arranged; but this is immaterial, for they may be disposed at an angle or vertically, if desired. Furthermore, the coils are simply illustrative of any desired kind of expansion-chamber suitable for accomplishing the purpose, and it is distinctly to be understood that the invention is not limited to said coils, for other devices may be substituted therefor without departure therefrom.

Connected with a portion of the coil or expansion-chamber 6 is a pipe 7, and with a similar portion of the coil or expansion-chamber 6' is a pipe 7', and these pipes are utilized for the delivery of the volatile refrigerating agent employed—for instance, anhydrous ammonia—to said coils. This liquid is caused to enter the coils or expansion-chambers under forced pressure from a tank or receiver or other receptacle, and the liquid may be of any desired kind proper for accomplishing refrigerating-work.

The ammonia-receiver 8 is connected by a pipe 9 with a pipe 10, to which branch pipes 12 and 13 are coupled, as shown in Fig. 1, and these branch pipes are united to short sections 12' 13', respectively, to which valve-chambers, (designated in a general way by 14 14') are connected, the opposite sides of said valve-chambers being united to the inlet-pipes 7 and 7'.

Connected to the outlet extensions 15 15'

of the coils constituting the expansion-chambers 6 and 6' are branch exhaust-pipes 16 16', which are united by a T or other suitable coupling to an exhaust-pipe 17. Adjacent to one end this pipe 17 connects with a branch 18, coupled to a pipe 19, leading to a pump 20 of ordinary construction, and leading from said pump 20 is a branch 21, coupled to an extension 22' of a condensing-coil 22, said coil having another extension 22², which delivers the liquid from the coil to an ammonia-receiver 8. This coil 22 is located in a tank 23, to which water is supplied by a pipe 24, having a connection 25 to a street service-main, (not shown,) and passing through the wall of tank 23 is an overflow-pipe 26, which will prevent the water in said tank from rising above a certain level.

Within each compartment 5 5' is placed a thermostat 27 27', respectively, and these thermostats may be of any desired kind, that in compartment 5 being of bow form, with a leg 27², adapted when the thermostat is effected by rising temperature and expands to engage a contact-point, and thereby establish an electrical circuit for energizing the magnets of the inlet-valve hereinafter described, and that in compartment 5' being of the type in which a column of mercury 27³ makes connection with a terminal of one of the wires leading to the magnets for actuating the valve in chamber 14'. Any kind of thermostat may be substituted for either of those shown, provided it is suitable for the purpose desired.

Coming now to the valve-chambers 14 14', connecting the pipes 7 and 12 and 7' and 13, each of said chambers is alike and consists of a casing 28, secured by screws 29 to a partition or other support 30. Projecting from the casing is a non-frost-collecting shelf 31, the paper-pulp product known as "hard fiber" having been found in practice to prevent the accumulation of frost which always impairs the efficiency of the magnets hereinafter described. Upon this fibrous shelf 31 is a base 32, supporting a pair of solenoid or other suitable magnets 33, the cores 34 of which are united by an armature 35. Within the valve-chamber 14 are perforated lugs 36, and at one side of said lugs is a tubular projection 37, closed at one end and having a port 37' for delivering the fluid employed from the valve-chamber, to which it is fed, to the expansion-chamber 6 by the inlet-pipe 7, said liquid entering the valve-chamber by pipe 12', above described. Fitted for reciprocatory movement in the perforated lugs 36 is a needle-valve 38, and surrounding the stem of said valve between the lugs is a coiled spring 39, which bears at one end against the under side of one of the lugs and at its opposite end against a pin 40 on the valve-stem and tends normally to close the valve. At the end opposite to its valve portion 38' the stem 38 is provided with a head 38² for accomplishing a purpose hereinafter described.

Journalled in bearings 41 of the chamber 14

is a rock-shaft 42, and secured to said rock-shaft within the valve-chamber is a curved arm or wiper 43, which bears against the under side of the valve-stem head 38². This rock-shaft passes through a bushing 44 to the exterior of the casing 28, and to its outer end is secured a lever 45, connected by a link 46 with an armature or cross-bar 35. Passing through a bracket 47 of the chamber 14 is a screw 48, and connected to said screw and to the lever 45 is a spring 49, which normally tends to lift said lever and its connected armature and permit the valve to be closed by the spring 39. Threaded into a part of the casing is a stop-screw 50, carrying a jam-nut 51, and by adjusting this screw the opening movement of the valve may be regulated as desired. Connected with the coils of the magnets are wires 52 and 53, wire 52 being attached to a terminal from contact-point 28 and wire 53 to a terminal leading to a wire 80, connected to the generator, (see Fig. 1,) and when the temperature rises in the refrigerating-compartment the leg 27² of the thermostat will expand, engage the contact-point 28, and cause a circuit to be established which will energize the magnets 33, thereby causing said magnets to actuate the lever 45 and raise the valve 38, thus permitting an inflow of volatile liquid to the expansion-chamber 6. When the temperature in the refrigerating-compartment falls, the thermostat will contract, thereby interrupting the connection and permitting the valve 38 to close under the action of spring 39 and shut off the supply of refrigerating liquid. In the compartment 5' the action is the same, although a different form of thermostat is shown, and the electrical connections to said compartment are indicated by the powers of the numerals above mentioned. Here it may be well to mention that the invention is not limited to a pair of refrigerating-compartments, for one or any desired number may be employed, as circumstances require.

In apparatus of the class described it frequently happens that the pressure of the vapor in the coils varies both above and below the normal standard, and as it is a desideratum to maintain this pressure constant, and thereby prevent undue back pressure upon the pump for exhausting the vapor from the expansion-chamber and forcing it into the condenser, I have devised the following means for accomplishing this purpose and also for controlling the admission of fluid to said expansion-chamber. Should it happen that all of the thermostats in the refrigerating-compartments are open, it is desirable to save water by shutting off the supply to the tank in which the condenser is mounted, and the valve for accomplishing this result is also controlled by the device actuated by a variation in the pressure, as will hereinafter be described.

The suction-pipe 19 of the pump 20 is carried above the branch 18, extending from the

pipe 17, the latter communicating by conduits 16 16' and 15 15' with expansion-chambers 6 6', and in this extension of pipe 19 is formed a coil 19', (although this may be omitted, if desired,) the upper end of which is closed by a T-coupling 54, connected by a short pipe 55 with another T-coupling 56, communicating with a curved and substantially horseshoe-shaped expansible and contractible tube 57. This tube is extremely sensitive to variations in pressure and at its free end carries an insulated plate 58, in which are fitted screws 59 and 60, respectively, the screw 60 being so adjusted that its point is somewhat lower than that of the point of the screw 59. Carried by a plate 61, formed of insulating material and secured to one end of the coupling 56, are cups 62 and 63, respectively, containing mercury or other equivalent conducting fluid. To the screw 60 is connected the terminal of a wire 64, leading to the battery or other generator, and to the cup 63 is attached the terminal of a wire 65, leading by branch 65' to the contact 28' of thermostat 27 and also leading to contact 28³ of thermostat 27', while screw 59 is connected to wire 64', leading from wire 64, and the terminal of a wire 67 is in engagement with the cup 62. Other suitable contacts may be substituted for those shown without departure from the invention. The wires 65 and 65' are connected with the contacts 28' 28³ of the thermostats, as shown in Fig. 1. With this construction should there be back pressure such pressure will tend to straighten or expand the coil 57, thereby withdrawing the tip of screw 60 from the mercury in cup 63 and causing the circuit to be opened between the generator and the electromagnets, the result being that said magnets will be deenergized and the valve 38 will be forced to its seat by spring 39, to thereby shut off the supply of refrigerating liquid to the compartments 5 5'. It is of course to be understood that the pump 20 is constantly at work and that when the supply-pipe is closed by the valve, as just stated, said pump continuing its work will soon cause a reduction of pressure in the various pipes of the system and in the flexible expansion device 57. This will cause the device 57 to curve inward and throw the contact-point of screw 60 into engagement with the mercury in cup 63, thereby again closing the circuit, energizing the magnets, and reopening the valve or valves in the supply-pipes leading to the expansion coils or chambers. The wires 64, 64', and 67, connected, respectively, to the screw 59 and cup 62, lead to a pair of electromagnets 68, which when energized shut off the supply of water from the pipe 25 to tank 26. The numeral 69 designates a valve-chamber with which the inlet-pipe 25 is connected, and within this valve-chamber is a disk 70, having a transverse port 70', said disk being connected to a rod or shaft 71, projecting through the head of the valve-chamber. Upon this rod or shaft 71 is clamped an arm

72, connected at one side of its axis with a link 73, which is in turn articulated to a loop-shaped solenoid 74, the arms 74' of which are the cores of the magnets 68. Normally the port 70' of the valve-chamber 69 is in alignment with the pipes 24 and 25, for when the magnets are deenergized the connected solenoids drop by gravity and turn said disk to such position as illustrated by dotted lines in Fig. 8. This gravital action may be aided by a spring or weight, if necessary, and the turning of the valve-disk 70 may be regulated by adjustable stops 75 75', the latter being fitted over a bolt or set-screw 76, threaded into the head of the valve-chamber. The second contact-screw 59 is, as will be observed by Fig. 2, so adjusted that its point is higher than that of the point of screw 60, and consequently the circuit leading to the magnets 68 for actuating the valve 70 is not closed unless the temperature of all the refrigerating-compartments is so low that the thermostats are open, in which case the pressure in the pipes will cause the free end of the regulator 57 to be carried inward to such an extent that the contact of screw 59 described will be made, the circuit will be closed, and the magnets 68 energized to turn the valve and shut off the supply of water to tank 23.

In Fig. 3 I have illustrated a modified form of pressure-actuated regulator, which may be employed as a substitute for that shown in Fig. 2. This form consists of a casing 80, having a threaded extension 80', which will be screwed upon the end of the part 19' of pipe 19. This casing is in two parts 81 and 82, respectively, which are secured together by bolts 83, passing through flanges 84, projecting from the sections of the casing. Clamped between these flanges is a diaphragm 85, and secured to the top section of the casing is a standard 86, in which is pivoted an arm of lever 87, the yoke of which is composed, preferably, of insulating material, in the ends of which the screws 59 and 60, heretofore described, are mounted. Also secured to the top of the casing is an insulated plate 88, carrying the cups 62 and 63, heretofore described. Threaded within the top plate of the casing 80 is a tubular screw 89, and passing through said screw is a shank 90, having at its lower end a head 90', which bears against the diaphragm 85, a spring 91 serving to force the head 90' downward against the diaphragm. Variations in the pressure of the refrigerating fluid employed will cause this diaphragm to be affected in the same way as the regulator illustrated in Fig. 2, and when the pressure varies to a certain extent in the pipes the lever 87 will be forced downward by the spring 91, thereby causing normal conditions to be reestablished through the contact of the screw 60 with the cup 63. In this modification the screw 59, cup 62, and their connections operate in the same manner as similar parts (illustrated in Fig. 2) for shutting off the water-supply.

In the operation of my improved apparatus should the temperature rise in the refrigerating-compartments or any of them the thermostat will be affected and will close the circuit, thereby energizing the magnets and opening the valves, and should the pressure within the expansion-chambers produce back pressure on the pump the regulator, which is very sensitive to the slightest variation in the pressure, will act to open the circuit, thereby de-energizing the magnets, and consequently closing the valves. So, too, if the temperature is low in the compartments and the thermostats are open the decrease in pressure in the exhaust-pipe system will cause the regulator to bring the point 59 into contact with cup 62, thereby closing the circuit and energizing the magnets for actuating the valve to shut off the water-supply, as above stated.

My invention is not limited to any particular form of regulator for carrying out these results, and substitutes may be employed for the two forms shown, if desired.

Any desired kind of magnets may be employed for actuating the valves, and the invention is not limited to the solenoids shown and described. Variations may also be made in the details of the pipe system and valves without departure from the invention.

Having thus described my invention, I claim—

1. In a refrigerating apparatus, the combination with a compartment, of an expansion-chamber within the compartment; a valve for regulating the admission of refrigerating fluid to the expansion-chamber; an electromagnet capable, upon being energized, of opening the valve; an electric circuit connected to the electromagnet; a thermostat, operable upon reduction of temperature within the compartment, to open the circuit of the magnet; and means actuated by variation of pressure within the chamber and capable of opening the circuit upon rise of pressure.

2. In a refrigerating apparatus, the combination with a compartment, of an expansion-chamber within the compartment; an inlet-valve for regulating the admission of refrigerating liquid to the expansion-chamber; an electromagnet for actuating the valve; a thermostat within the compartment and in circuit with the electromagnet for opening and closing the circuit upon predetermined falls and rises, respectively of temperature within the compartment; and means actuated by pressure within the chamber and in circuit with the electromagnet and with the thermostat for opening and closing the circuit upon predetermined rises and falls, respectively, of pressure within the chamber, the organization being such that either a fall of temperature or a rise of pressure will open the circuit and a contemporaneous rise of temperature and fall of pressure will close the circuit.

3. The combination with a series of refrigerating-compartments, of expansion-cham-

bers located in the compartments; a conduit for supplying fluid to each of the expansion-chambers; inlet-valves for the respective supply-conduits; electromagnets for severally actuating the valves; a thermostat within each of the refrigerating-compartments; common means connecting all the chambers; a regulator connected with the connecting means and actuated by a variation of pressure in any of the expansion-chambers; and electrical connections between the regulator and the magnets for actuating the inlet-valves, the respective thermostats and the regulator coöperating to control each of the valves through its respective magnet.

4. In apparatus of the class specified, the combination with compartments, of coils located within the compartments; pipes for conveying refrigerating liquid to the coils; valve mechanisms connected with the pipes; a thermostat in each compartment; electrical connections between the thermostat and the valve mechanisms; outlet-pipes for the coils in the compartments; a pump for withdrawing fluid from all the refrigerating-coils; pipe connections between the pump and the outlet-pipes of all the coils; a regulator actuated by the pressure from the coils; and electrical connections between the regulator and each of the inlet-valves.

5. The combination with a compartment, of an expansion-chamber in the compartment; a valve for controlling the supply of liquid to the expansion-chamber; means for unseating the valve; a thermostat within the compartment; a magnet for actuating the valve-unseating means; electrical connections between the thermostat and magnet and operative by the thermostat; and means actuated by the pressure of the refrigerating medium and operative upon the electrical connections between the thermostat and magnet.

6. The combination with a compartment, of an expansion-chamber in the compartment; a valve-chamber in connection with the expansion-chamber and having an inlet-port; a valve for normally closing the inlet-port; a lever for unseating the valve; a thermostat within the compartment; an electromagnetic device for actuating the lever; electrical connections between the thermostat and device and operative by the thermostat; and means between the thermostat and magnet actuated by the expansion pressure operative upon the electrical connections.

7. The combination with a refrigerating-compartment, of an expansion-chamber located within the compartment; an inlet-pipe for supplying refrigerating liquid to the chamber; a valve-chamber connected to the inlet-pipe, the chamber having a port; means for supplying fluid to the valve-chamber; a normally closed valve for the port in the valve-chamber; an electromagnet which, when energized, opens the valve; a thermostat; electrical connections between the thermostat

and the magnet; and means operated by the pressure of the expansion and coöperative with the thermostat for permitting the energization of the electromagnet.

5 8. The combination with a refrigerating-compartment, of an expansion-chamber located within the compartment; an inlet-pipe for supplying refrigerating liquid to the chamber; a valve-chamber connected with the inlet-pipe; a port from the valve-chamber to the inlet-pipe; a valve for the valve-chamber; means for normally closing the valve; a device for opening the valve against the pressure of the closing means; a thermostat within the refrigerating-compartment and affected by change of temperature therein; electromagnetic devices for actuating said device; electrical connections between the thermostat and the electromagnetic devices; and automatic means independent of the thermostat and actuated by the pressure of the refrigerating medium for making and breaking the electrical connections.

25 9. The combination with a refrigerating-compartment, of an expansion-coil located within the compartment; an inlet-pipe for supplying refrigerating liquid to the coil; a valve-chamber having a port connected with the inlet-pipe; means for supplying refrigerating liquid to the valve-chamber; a reciprocating valve for opening and closing the port; a head upon the valve-stem; a spring for normally closing the valve; a rock-shaft mounted in the valve-chamber; a cam carried by the rock-shaft and adapted to engage the head to open the valve; a lever connected to the rock-shaft; an electromagnet for actuating the lever; a thermostat within the refrigerating-compartment; electric connections between the thermostat and the magnet; and a make-and-break device actuated by the pressure in the expansion-coil for controlling the connections between the thermostat and magnet.

45 10. The combination with a refrigerating-compartment, of an expansion-chamber within the compartment; an inlet-pipe for conveying expansive fluid to the expansion-chamber; a valve-chamber connected to the inlet-pipe, and having a port; a valve-stem mounted in guides of the valve-chamber, and having a head at one end, and shaped to fit the port at the opposite end; a rock-shaft mounted in the valve-chamber; a cam carried by the rock-shaft and adapted to engage the head of the stem to actuate the valve in one direction; a spring for actuating the valve in the opposite direction; a pivoted lever attached to the rock-shaft; a pair of electromagnets for actuating the lever in one direction; an adjustable spring independent of the valve-spring for actuating the lever in the opposite direction and for sustaining the weight of the lever; a thermostat within the refrigerating-compartment; and an electric circuit connecting the thermostat with the electromagnets.

65 11. In a refrigerating system utilizing the expansion of fluid to cause reduction of tem-

perature, the combination with a plurality of compartments, of an expansion-chamber for each compartment; a valve for controlling the admission of expansible fluid to each chamber; electrically-operated means for controlling the actuation of each valve; a common exhaust for the chambers; a thermostat for each compartment; an electrical circuit for each compartment embracing the thermostat and valve-controlling means; means for withdrawing from the exhaust and condensing the expanded fluid; means for supplying a flow of fluid to cool the condensed fluid; means actuated by an electric circuit for controlling the flow of cooling fluid; means actuated by change of pressure in the common exhaust for opening all the compartment-circuits independently of the thermostats and for closing the same coöperatively with the respective thermostats and for affecting the circuit for actuating the means for controlling the flow of cooling fluid; and means for adjusting the same for opening and closing the former circuit and for affecting the latter circuit respectively at different predetermined pressures.

12. In refrigerating apparatus, the combination, with a refrigerating-compartment, of an expansion-coil located within said compartment; an inlet-pipe leading to said coil; valve mechanism connected with the inlet-pipe; a thermostat within the compartment; electrical connections between said thermostat and the valve mechanism; an exhaust-pipe leading from said coil; a pump connected with said exhaust-pipe; a regulator actuated by a variation in the pressure of the fluid contained in the coil and pipe system; electrical connections between the regulator and inlet-valve to the coil; a condenser; means for supplying water to said condenser; a valve for controlling the supply of water; and electric connections between the regulator and said valve.

13. In refrigerating apparatus, the combination, with a series of compartments, of an expansion-chamber in each compartment; an inlet-pipe leading to each expansion-chamber; electrically-controlled valves connected with the respective inlet-pipes; a pipe for supplying fluid under pressure to the inlet-pipes; exhaust-pipes leading from the several expansion-chambers; an exhaust system with which the exhaust-pipes are connected; a pump; a pressure-actuated regulator connected with the exhaust system; and electrical connections between the regulator and each of the electrically-controlled valves of the inlet-pipes.

14. In refrigerating apparatus, the combination, with a compartment, of an expansion-coil located in the compartment; a thermostat within the compartment; an inlet-pipe leading to the expansion-coil; a valve for the inlet-pipe; electromagnets connected with the thermostat; means controlled by the magnets for actuating the valve; an exhaust-pipe

leading from the expansion-coil; a pressure-actuated regulator connected to said exhaust-pipe; and electrical connections between the regulator and the valve-actuating magnets, the regulator and thermostat controlling the valve through the same magnets.

15. In refrigerating apparatus, the combination, with a compartment, of an expansion-coil located within the compartment; an inlet-pipe to the coil; a valve-chamber connected with the inlet-pipe, and having a port; a valve within the valve-chamber; devices for actuating the valve; electromagnets which, when energized, actuate said devices; a thermostat within the compartment; electric connections between the thermostat and the electromagnets; an exhaust-pipe leading from the expansion-coil; an expansible pressure-actuated regulator connected with the exhaust-pipe; electrical connections between the regulator and the valve-actuating magnets; means for exhausting the fluid from the expansion-coil; and a condenser into which the fluid is forced.

16. In a refrigerating apparatus, the combination with a compartment, of an expansion-chamber in said compartment; a valve for regulating the admission of refrigerating liquid to said expansion-chamber; a thermostat in said compartment; an electromagnet controlled by the thermostat for actuating the valve; a regulator comprising an expansible tube actuated by variations of pressure in the expansion-chamber and connected with said electromagnet for actuating the valve.

17. In a refrigerating system utilizing the expansion of fluid to cause reduction of temperature, the combination with a plurality of compartments, of an expansion-chamber for each compartment; a valve for controlling the admission of expansible fluid to each chamber; electrically-operated means for controlling the actuation of each valve; a common exhaust for the chambers; a thermostat for each compartment; an electrical circuit for each compartment embracing the thermostat and valve-controlling means; means for withdrawing from the exhaust, and condensing, the

expanded fluid; means for supplying a flow of fluid to cool the condensed fluid; means actuated by an electric circuit for controlling the flow of cooling fluid; and means actuated by change of pressure in the common exhaust for opening all the compartment-circuits independently of the thermostats and for closing the same coöperatively with the respective thermostats, and for affecting the circuit for actuating the means for controlling the flow of cooling-fluid upon reduction of pressure.

18. In a refrigerating system utilizing the expansion of fluid to cause reduction of temperature, the combination with a plurality of compartments, of an expansion-chamber for each compartment; a valve for controlling the admission of expansible fluid to each chamber; electrically-operated means for controlling the actuation of each valve; a common exhaust for the chamber; a thermostat for each compartment; an electrical circuit for each compartment embracing the thermostat and valve-controlling means; means for withdrawing from the exhaust, and condensing, the expanded fluid; means for supplying a flow of fluid to cool the condensed fluid; means actuated by an electric circuit for controlling the flow of cooling fluid; a circuit-closer for opening all the compartment-circuits independently of the thermostats and for closing the same coöperatively with the respective thermostats; a circuit-closer for opening and closing the circuit for actuating the means for controlling the flow of cooling fluid; means actuated by change of pressure in the common exhaust for controlling both circuit-closers; means for adjusting the compartment-circuit closer for opening and closing the circuits at predetermined pressure; and means independent thereof for adjusting the flow-circuit closer for opening and closing at predetermined pressures.

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Witnesses:

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