

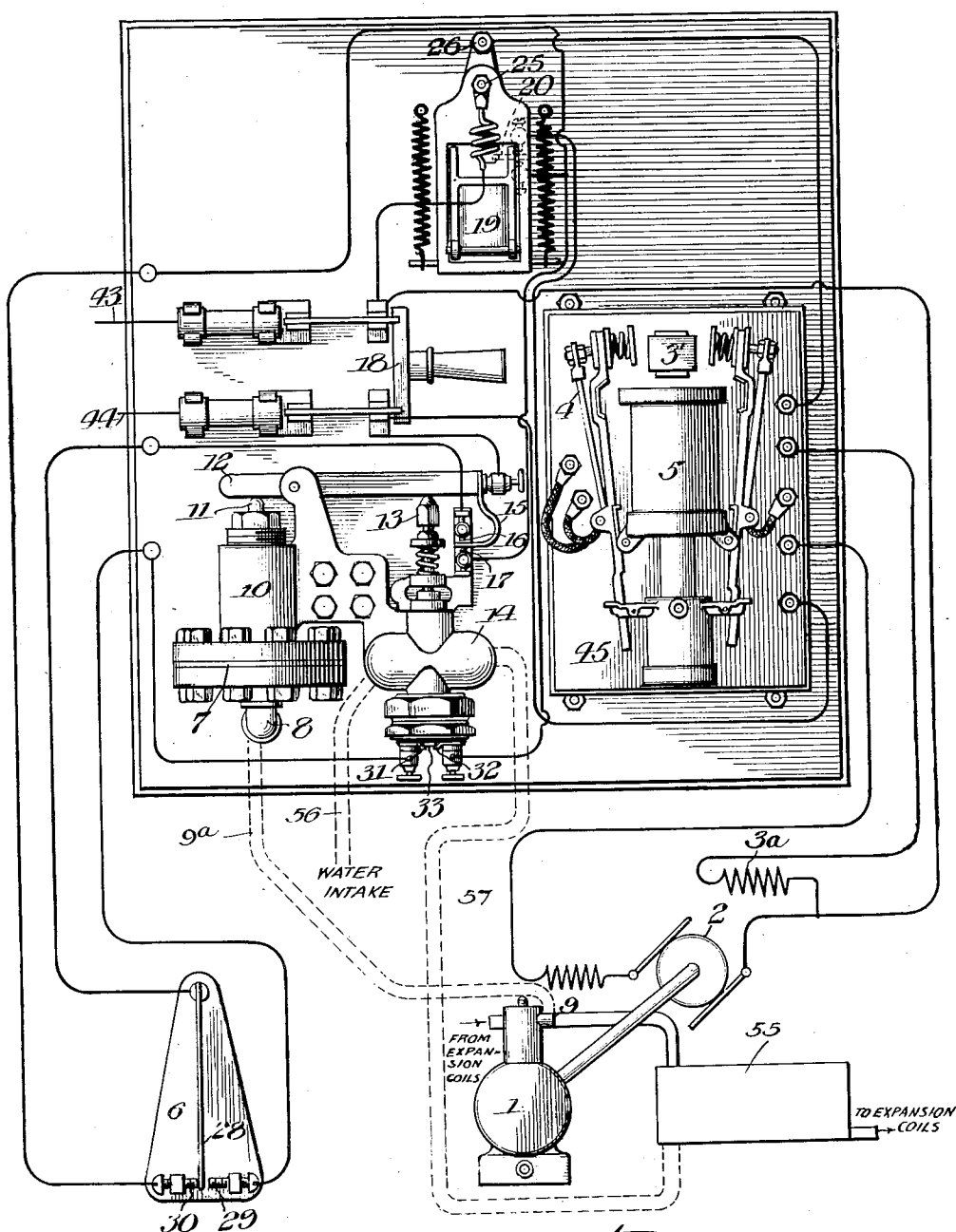
J. M. PETERSON.
REFRIGERATING APPARATUS.
APPLICATION FILED DEC. 4, 1915.

1,225,850.

Patented May 15, 1917.

2 SHEETS—SHEET 1.

Fig. 1.

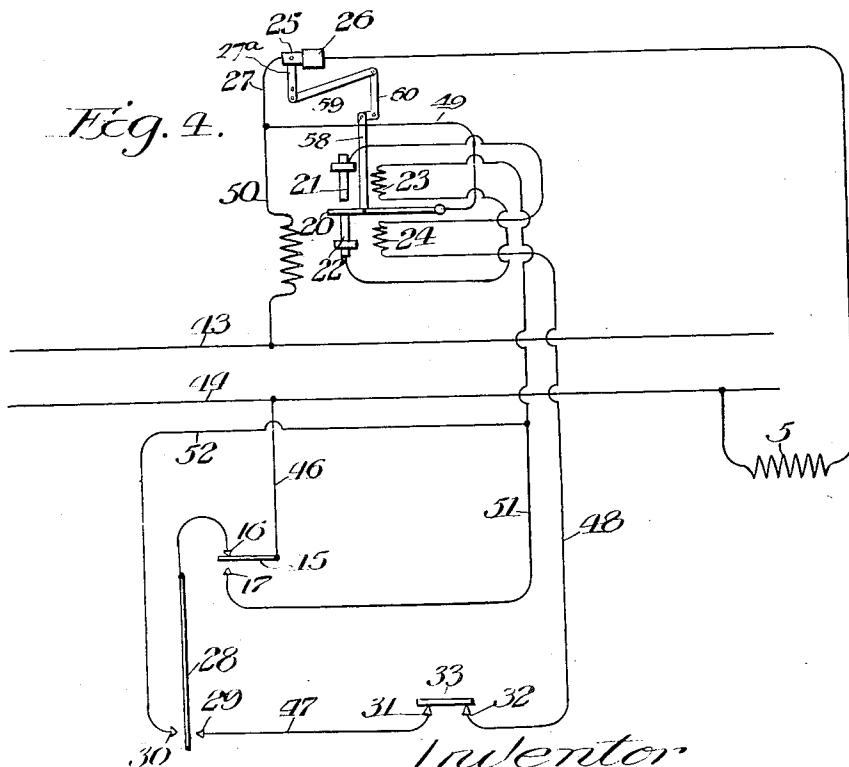
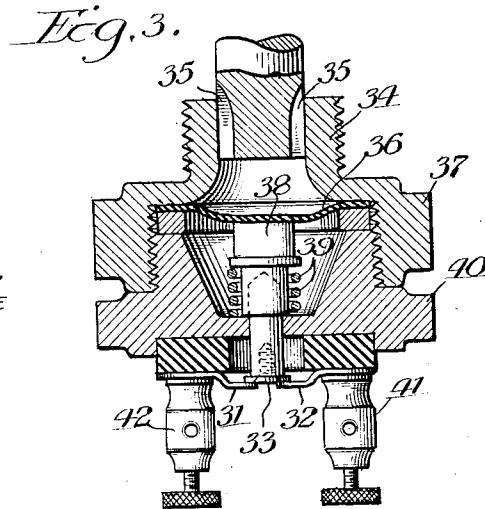
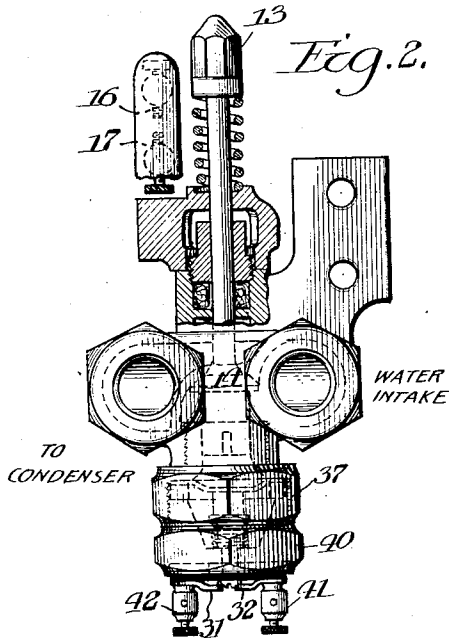


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REFRIGERATING APPARATUS.

1,225,850.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOHN M. PETERSON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Refrigerating Apparatus, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to refrigerating systems, and has for its object the provision of improved thermostatic means to control the compressor. My improved structure contemplates the control of the operations of a compressor not only in response to the actions of a thermostatic element, but also in response to the presence or absence of water, and in response to the pressure of the high side of the compressor.

In general, my system is of use both for direct current and alternating current purposes, it being contemplated that I use a motor to operate the compressor. The starting and stopping of this motor is under the control of a suitable switching device, which switching device operates in response to a thermostatic element, and which is also controlled by suitable instrumentalities responsive to the presence or absence of cooling water, and suitable instrumentalities responsive to the pressure of the high side of the compressor.

I will explain my invention more in detail by referring to the accompanying drawings illustrating the same, in which—

Figure 1 is a diagrammatic view illustrating the various instrumentalities employed together with their circuit connections;

Fig. 2 is a side view partly in section of the water valve structure;

Fig. 3 is a fragmentary longitudinal sectional view of the lower portion of the water valve structure shown in Fig. 2, and

Fig. 4 is a fragmentary diagrammatic circuit view.

My improved device contemplates a suitable compressor 1 driven by the motor 2. This motor has a suitable field winding 3^a and has its circuit continued through a starting switch 3', this starting switch being of the standard style, having a plurality of arms 4, 4 which control the various resistances included in the motor circuit. The switch 3 has a coil 5 which controls the

movement of the arms 4 successively into their position, and which coil holds the arms in their circuit closing position so long as the coil is energized, but which permits these arms to fall back in their non-circuit closing position as shown in the figure when the coil is not energized.

The compressor 1 is of course designed to supply refrigerant to certain refrigerating chambers as well understood, the connections not thought being necessary for illustration. A thermostat 6 is responsive to the temperature of the refrigerating chambers, and a pressure responsive diaphragm 7 is under the control, by means of the pipe 8 of the high side of the compressor so that the pressure of this high side is communicated to the lower side of the diaphragm 7 of the device 10 through the agency of the pipe 9^a leading to the pipe 8 from the high pressure outlet 9 of the compressor 1. The refrigerant under pressure is supplied through the pipe 9 to the condenser 55 from which of course as is customary, the refrigerant leads to the expansion coils. Cooling water for this condenser is obtained through the water intake pipe 56 leading through the valve structure 14 which controls the flow of this water, the water then flowing to the condenser through the pipe 57. This diaphragm actuates a plunger 11 to control the position of a lever 12 as will appear presently. The lever 12 operates a valve spindle 13 to open or close the valve 14, and this lever at the same time carries a spring contact 15, which contact may engage either of the contacts 16 or 17. The contact 17 is normally not engaged unless the pressure of the high side reaches such a large amount (as due, for instance, to the absence of water) that it is desirable to stop the operations of the compressor, whereupon the closure of the circuit between the elements 15 and 17 causes indirectly a deenergization of the coil 5 as will presently appear. Normally, of course, the elements 15 and 16 remain in contact. A main line switch 18 is provided and also a switching device 19, the connections of which switching device are shown more clearly in Fig. 4. The valve stem 13 of course when pushed downwardly increases the supply of water furnished to the condenser. The device 19 has an arm 20 which either engages the contact 21 or the contact 22 depending upon whether the coil

23 or coil 24 was last energized. If coil 24, for instance, has been energized last it has pulled the arm 20 into engagement with the contact 22, and at the same time has closed the main line contacts 25 and 26. Now if the coil 23 should be energized temporarily, then the arm 20 is pulled against contact 21, and at the same time circuit between contacts 25 and 26 is interrupted by moving the arm 27 to the left (Fig. 4). As before stated, the pressure of the high side of the system is furnished to one side of the diaphragm 7 by the pipe 8, and this controls the supply of water furnished the condenser through the valve 14. The thermostat 6 has the movable element 28 and the two contacts 29 and 30. The valve 14 controls the circuit through two contacts 31 and 32 by virtue of the movable contact element 33. This valve 14 as shown more clearly in Figs. 2 and 3 has the valve spindle 13 at its lower extremity operating in a seat 34, this valve spindle having cut-away portions 35 so that water can flow past the valve spindle when there is water available, which water acts against a diaphragm 36 fastened within the lower nipple 37 of said valve structure. This diaphragm acts against a plunger 38 normally pressing it downwardly to have the contact 33 engage the contacts 31 and 32 respectively when, as stated before, there is water available for the use of the system. A spring 39 normally presses the diaphragm 36 upwardly to break the contacts through the circuit 31 and 32 unless such water supply is available. A cap 40 completes the lower portion of the valve structure, and insulating binding posts 41 and 42 serve to complete the circuit to the contacts 31 and 32. The main line circuit extends from the conductors 43 and 44 through the switch 18, directly through the starting device 45 to the motor 2, thus to operate this motor. The circuit, of course, while primarily completed by the switch 18 is dependent for its subsequent closure upon the energization or deenergization of the coil 5. The energization of the coil 5 is controlled by the switching device 19 which in turn is controlled by the thermostat 6, the contacts 15, 16 and 17 under control of the element 10, and the contacts 31, 32 and 33 responsive to the presence or absence of water in the condensing system.

I will now describe more in detail, by referring to Fig. 4, the general circuit conditions which obtain whereby the device 19 controls the energization or deenergization of the coil 5. Assuming, to start with, that the switch 18 is closed, and that the room to be refrigerated is of course at a temperature higher than it is supposed to have, then the thermostatic element 28 will be in engagement with the contact 29. Thereupon a circuit is established from the conductor 44,

by way of conductor 46, contact element 15, contact element 16, element 28, contact 29, conductor 47, contacts 31, 33 and 32, conductor 48, coil 24, contact 21, arm 20, (which was then engaging the contact 21) conductor 49, conductor 50, to the main line 43. Thereupon the arm 20 is switched into the position shown in Fig. 4, thus breaking the circuit through the coil 24 and at the same time the contacts 25 and 26 are brought together as shown in Fig. 4. It will thus be seen that in order to close this circuit, which starts the operation of the motor, it is necessary that the pressure of the high side of the system be not large enough to disengage contacts 15 and 16, and it is also necessary that there be water in the valve 14 as otherwise contacts 31, 33 and 32 will not be in engagement. There is thus a double safeguard so that the motor cannot start operating without water being on hand for cooling purposes. If then the pressure of the high side reaches too high an amount, which may happen due to the failure of the water supply, then contacts 15 and 17 engage, whereupon a circuit is established which extends by way of conductor 44, by way of conductor 46, contacts 15 and 17, conductor 51, coil 23, contact 22, arm 20, conductor 49, conductor 50, to the main line 43, whereupon the arm 20 is switched to its alternative position, and the circuit between elements 25 and 26 broken. It must be understood of course that the coil 5 is energized to keep the motor in operation whenever contacts 25 and 26 are closed.

Assuming, however, that the parts are again in the position of Fig. 4, and that the temperature of the room is sufficiently lowered so that the motor need not continue running, then the element 28 engages the contact 30, whereupon a circuit is established extending from the main line 44 by way of conductor 46, contacts 15 and 16, element 28, contact 30, conductor 52, coil 23, contact 22, arm 20, conductors 49 and 50, to the main line 43, thus again drawing the arm 20 to its alternative position and opening the circuit through elements 25 and 26 to deenergize coil 5.

Contact arm 20 controls the switch contact 25 through the interposition of the links 58 and 59 and the levers 27 and 60.

It can thus be seen that normally when the water supply is available and when the pressure in the high side is not too high, that then the thermostatic element 28 by its position controls the starting and stopping of the motor 2. The pressure or absence of water however controls the operation of the motor as already explained.

From what has been described the nature of my invention will be readily clear to those skilled in the art. Having however thus described one form which my invention may

take, what I claim as new and desire to secure by Letters Patent is:

1. A refrigerating system having a compressor for compressing refrigerant, a water supply valve for controlling the supply of condensing water, a thermostat responsive to the temperature of a chamber to be cooled by said refrigerant, a motor for operating said compressor, means responsive to the pressure on the high side of said compressor to control said valve, and means controlled by said first aforesaid means and said thermostatic element to govern the operations of said compressor, said last aforesaid means including a diaphragm responsive to water pressure, and a plurality of contacts controlled thereby.

2. A refrigerating system having a compressor for compressing refrigerant, a water supply valve for controlling the supply of condensing water, a thermostat responsive to the temperature of a chamber to be cooled by said refrigerant, a motor for operating said compressor, means responsive to the pressure on the high side of said compressor to control said valve, and means controlled by said first aforesaid means, said thermostat, and by the presence of said condensing water to govern the operations of said compressor, said last aforesaid means including a diaphragm responsive to water pressure, and a plurality of contacts controlled thereby.

3. A refrigerating system having a compressor for compressing refrigerant, a water supply valve for controlling the supply of condensing water, a thermostat responsive to the temperature of a chamber to be cooled by said refrigerant, a motor for operating said compressor, means responsive to the pressure on the high side of said compressor to control said valve, and switching means controlled by said first aforesaid means and said thermostatic element to govern the operations of said compressor, said last aforesaid means including a diaphragm responsive to water pressure, and a plurality of contacts controlled thereby.

4. A refrigerating system having a compressor for compressing refrigerant, a water supply valve for controlling the supply of condensing water, a thermostat responsive to the temperature of a chamber to be cooled by said refrigerant, a motor for operating said compressor, means responsive to the pressure on the high side of said compressor to control said valve, and switching

means controlled by said first aforesaid means, said thermostat, and by the presence of said condensing water to govern the operations of said compressor, said last aforesaid means including a diaphragm responsive to water pressure, and a plurality of contacts controlled thereby.

5. A refrigerating system having a compressor for compressing refrigerant, a water supply valve for controlling the supply of condensing water, a thermostat responsive to the temperature of a chamber to be cooled by said refrigerant, a motor for operating said compressor, means responsive to the pressure on the high side of said compressor to control said valve, and means controlled by said first aforesaid means, said thermostat and by means responsive to the presence of condensing water to govern the operations of said compressor, said last aforesaid means including a diaphragm responsive to water pressure.

6. A refrigerating system having a compressor for compressing refrigerant, a water supply valve for controlling the supply of condensing water, a thermostat responsive to the temperature of a chamber to be cooled by said refrigerant, a motor for operating said compressor, means responsive to the pressure on the high side of said compressor to control said valve, and means controlled by said first aforesaid means, said thermostat, and by means responsive to the presence of condensing water to govern the operations of said compressor.

7. A refrigerating system having a compressor for compressing refrigerant, a water supply valve for controlling the supply of condensing water, a thermostat responsive to the temperature of a chamber to be cooled by said refrigerant, a motor for operating said compressor, means responsive to the pressure on the high side of said compressor to control said valve, and an electro magnetic device controlled by said first aforesaid means, said thermostat, and by means responsive to the presence of condensing water to govern the operations of said compressor.

In witness whereof, I hereunto subscribe my name this 23rd day of November, A. D. 1915.

JOHN M. PETERSON.

Witnesses:

HAZEL ANN JONES,
A. LYDA JONES.