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R. E. SHULTZ

REFRIGERATING APPARATUS

Filed July 2, 1919

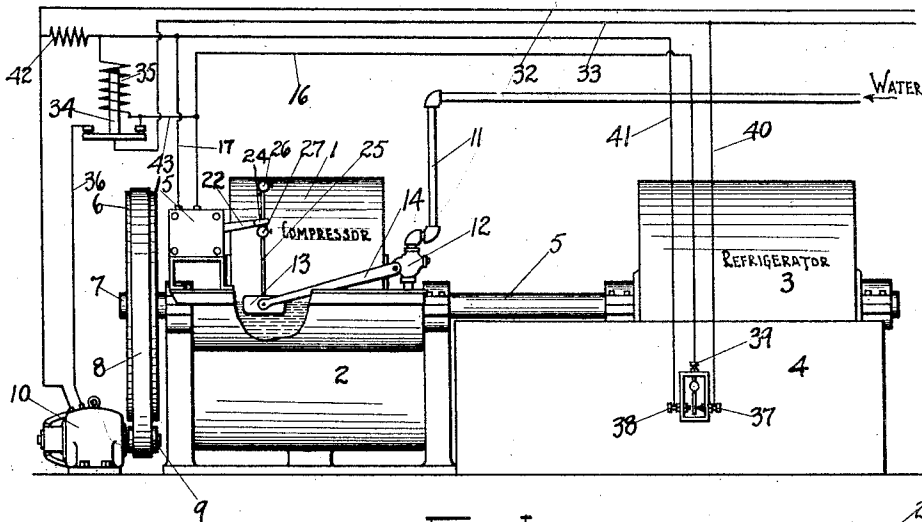


Fig. I.

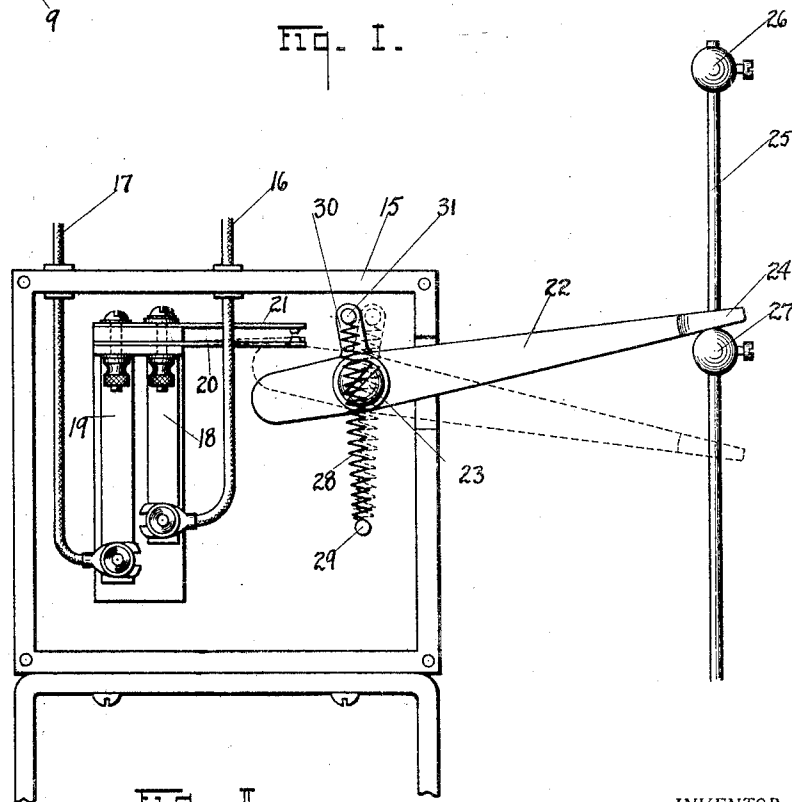


Fig. II.

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REFRIGERATING APPARATUS.

Application filed July 2, 1919. Serial No. 308,136.

To all whom it may concern:

Be it known that I, ROXY E. SHULTZ, residing at Toledo, in the county of Lucas and State of Ohio, have invented certain
5 new and useful Improvements in Refrigerating Apparatus, of which I declare the following to be a full, clear, and exact description.

This invention relates to a refrigerating
10 apparatus, and is particularly directed toward providing suitable controlling devices for properly controlling the operation of the refrigerating system.

One object of the invention is to provide
15 suitable control devices of the character specified, capable of operating independently to control the supply of power to the refrigerating apparatus.

A further object of the invention is to
20 provide a control system of the character set forth which is of simple construction and efficient in operation.

A further object of the invention is to
25 provide a novel form of actuating means for one of the control devices.

Further objects of the invention relate
to details of construction which will be more clearly set forth in the description to follow.

30 While the objects of the invention are preferably accomplished by the devices and means described in the following specification it is evident that the same may be varied widely without departing from the scope
35 of the invention as pointed out in the appended claims.

A structure constituting one embodiment
of the invention, which may be the preferred, is illustrated in the accompanying
40 drawing forming a part hereof in which:

Figure I is a side elevational view of the structure forming the refrigerating system, illustrating in diagram the circuit for supplying power to the motor.

45 Figure II is a side elevational view of the control mechanism employed for operating one of the controlling devices.

In the embodiment of the invention illustrated herewith the refrigerating apparatus
50 comprises a compressor 1 positioned within a water chamber 2 within which it is rotatably mounted, and an expansion chamber 3 suitably positioned within a refrigerating tank 4 and connected with a compres-

sor 1 by a hollow tube 5. The compressor 55 is operated by means of a drive pulley 6 mounted upon a shaft 7 and suitably connected by means of a belt 8 with the drive pulley 9 of an electric motor 10. In the
operation of devices of this character it 60 is desirable that suitable control means be provided for automatically controlling the supply of power to the compressor to stop the compressor when the mixture within the refrigerating chamber has reached a tem- 65 perature which is as low as it is desired to give the same, and this control is ordinarily accomplished by the provision of a thermostat whereby the current to the motor 10 is interrupted when the liquid within the re- 70 frigerating chamber 4 has reached the desired low point. The thermostat is preferably connected with the circuit to permit automatic starting of the motor when the temperature of the refrigerating chamber 75 has risen to such a point as to make it desirable that the refrigerating system be again operated.

The compressor 1 is positioned within the chamber 2 to which cooling water is sup- 80 plied to take the place of heated water that is drawn off through a waste pipe (not shown), in a manner common and well-known in machines of this character. Cooling water is admitted through a supply pipe 85 11 provided with a valve 12 adapted to be actuated by a float 13 which is operatively connected to the valve by means of a lever 14. It is highly desirable that the water in the chamber 2 be kept at a predetermined 90 height at all times in order to sufficiently cool the compressor and prevent the same from becoming overheated. In order to accomplish this purpose a second electric control circuit is provided which is adapted to 95 be placed in operation by means of the mechanism carried by the casing 15 and operatively connected with the float.

The conductors 16 and 17 comprising a part of this circuit are carried within the casing 15 and suitably secured to electrical connections 18 and 19 respectively, which connections are in turn electrically connected with spring terminals 20 and 21. A lever 22 is pivotally secured to a portion of the casing as at 23, the lever being provided with a forked end 24, the branches of which embrace the rod 25 carried by the float,

the forked end 24 of the lever being so positioned that it will slide between a pair of adjustable stop members 26 and 27 which are adjustably secured to the rod 25 at suitable points. A tension spring 28 is secured at one end to a fixed point 29 upon the casing, the opposite end of the spring being secured at 31 to an upwardly extending arm 30 carried by the lever 22.

The conductors 32 and 33 serve to provide a circuit from the generator (not shown) to the motor, when the magnet 34 is raised by the solenoid 35 so as to bring the conductor 36 into the circuit. The thermostat is provided with a pair of oppositely positioned terminals 37 and 38, and an intermediately positioned terminal 39 to which are connected respectively conductors 40, 41 and 16. The conductor 40 is connected with the conductor 33 at its opposite end, while the conductor 16 connects the intermediate terminal 39 of the thermostat with a conductor 18 placed within the housing 15, and the conductor 41 connects the terminal 38 of the thermostat with the conductor 32 through a resistance 42. The solenoid 35 is connected with the conductor 41 between the resistance 42 and the terminal 38, and a conductor 43 connects the opposite end of the solenoid with the conductor 16.

When the temperature of the refrigerating tank rises sufficiently, the terminal 39 of the thermostat is connected with the terminal 37 and a shunt circuit is formed which includes the conductors 40, 16, 43, whereby the solenoid 35 is placed in the circuit so as to raise the magnet 34 and thus complete the main circuit from the generator to the motor through the conductor 32, motor 10, conductor 36, magnet 34 and conductor 33. At the same time a shunt circuit is set up through conductor 32, resistance 42, solenoid 35, armature 34 and conductor 33 by means of which the magnet armature is held up after the connection between terminals 37 and 39 is broken. The circuit thus being complete, the motor is operated from the generator in the usual manner until the temperature of the refrigerating tank falls to such a point as to place the terminals 38 and 39 in communication with each other, or until the water level of the chamber 2 falls to such a point as to actuate the lever 22 and throw the same to the dotted position illustrated in Figure II, thereby forcing the contacts 20 and 21 into engagement. When the temperature of the liquid in the refrigerating tank falls to such a point as to place the terminals 38 and 39 in engagement, the solenoid 35 is short circuited by reason of a circuit being formed through the conductor 32, resistance 42, conductor 41, terminals 38 and 39, conductors 16 and 43, armature 34 and conductor 33 whereby the solenoid is de-energized and the magnet 34 permitted to

fall, thus breaking the main circuit to the motor 10. When the contact points 20 and 21 are forced into engagement by movement of the lever 22 to the dotted line position shown in Figure II a short circuit is formed in a similar manner through the conductor 32, resistance 42, conductors 17 and 19, terminals 21 and 20, conductors 18, 16 and 43, armature 34 and conductor 33, whereby the solenoid 35 is short circuited and the magnet 34 permitted to fall as before in such a manner as to break the main circuit to the motor. It will be noted that these two control mechanisms act independently of each other to break the main circuit to the motor 10. When the action of the compressor is stopped, the liquid in the refrigerating tank 4 will naturally experience a rise in temperature, and when the temperature has risen to such a point as to place the terminal 39 in engagement with the terminal 37, the solenoid 35 will be energized as previously described, thus closing the circuit to the motor 10 and permitting the same to be operated from the generator. Whenever it occurs that the operation of the motor is stopped by reason of the water having reached too low a level in the chamber 2, the float will rise as additional water is poured into the chamber until it reaches such a point that the stop 27 will force the forked end 24 of the lever 22 upwardly to such a point as to force the coiled tension spring beyond the dead center of the lever whereupon the contact points 20 and 21 will separate since these contacts are formed of resilient material, and will remain separated until such time as the level of the water in the chamber becomes so low that the stop 26 strikes the forked end 24 of the lever 22 and forces the same downwardly to such an extent as to throw the coiled tension spring 28 across the dead center of the lever in the opposite direction thus again placing the contacts 20 and 21 in engagement with each other. It is to be understood that when the water rises in the chamber 2 to such an extent as to throw the lever 22 into the full line position illustrated in Figure II of the drawing, the valve 12 will be closed and the contacts 20 and 21 will remain separated until such time as the lever 22 is positively actuated in the opposite direction. When the contacts 20 and 21 are thus separated it will be clear that until such time as the mechanism is put in operation the temperature of the liquid within the chamber 4 will continue to rise until it reaches such a point that the contacts 39 and 37 are placed in engagement with each other when as previously described, the circuit to the motor 10 will be closed and the apparatus thus set in motion whereupon it will continue to operate until the temperature of the liquid in the refrigerating tank 4 reaches a sufficiently low point to disconnect the main circuit, or until the

water in the chamber 2 again reaches such a low level as to positively operate the lever 22 for the purpose of placing the contacts 20 and 21 in engagement with each other.

5 It will be seen from the above description that applicant has provided a simple and efficient controlling means by which the operation of the refrigerating system is capable of being controlled both by the temperature of the liquid in the refrigerating tank and by the level of the water in the chamber 2. It will be seen further that each of these control devices is capable of operation independently of the other for the purpose of cutting out the power whenever it becomes necessary. Whenever the current to the motor is interrupted from either of these causes, the temperature of the liquid in the refrigerating tank will continue to rise and when it has reached such a point as to place the contacts 37 and 39 in engagement with each other, the circuit will be automatically closed at that time or as soon thereafter as the water in the chamber 2 has reached such a height as to throw the lever 22 into the full line position shown in Figure II.

It is to be understood that the showing and description of the invention illustrated herewith is for the purpose of rendering the invention more clear, and is not to be regarded as limiting the same to the details of construction illustrated or described, except in so far as certain limitations have been included within the terms of the following claims in which it is my intention to claim all novelty inherent in my invention broadly as well as specifically.

What I claim as new and desire to secure by Letters Patent is:

40 1. In a refrigerating apparatus, a compressor, a condenser, a motor for driving said compressor, means for cooling said condenser including a fluid circulating system, float controlled means for controlling the flow of fluid in said system, and means also

controlled by said float for stopping said motor.

2. In a refrigerating apparatus, a compressor, a condenser, a motor for driving said compressor, means for cooling said condenser including a fluid circulating system, float controlled means for regulating the flow of fluid in said system, and means also controlled by said float for starting and stopping said motor.

3. In a refrigerating apparatus, a compressor, a condenser, a motor for driving said compressor, a tank into which said condenser extends, a valve for controlling the flow of cooling fluid to said tank, a float in said tank for automatically operating said valve, and means also controlled by said float for stopping said motor.

4. In a refrigerating apparatus, a compressor, a condenser, a motor for driving said compressor, a tank into which said condenser extends, a valve for controlling the flow of cooling fluid to said tank, a float in said tank for automatically operating said valve, and means also controlled by said float for starting and stopping said motor.

5. In a refrigerating apparatus, a compressor, a condenser, a motor for driving said compressor, means for cooling said condenser including a fluid circulating system, a valve for said system, float controlled means for operating said valve, and snap-over mechanism controlled by said last-named means for stopping said motor.

6. In a refrigerating apparatus, a compressor, a condenser, a motor for driving said compressor, a tank into which said condenser extends, a valve for controlling the flow of cooling fluid to said tank, a float in said tank, means connected with said float for automatically operating said valve, and snap-over mechanism controlled by said means for stopping said motor.

In testimony whereof, I affix my signature.

ROXY E. SHULTZ.