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VALVE FOR REFRIGERATING SYSTEMS

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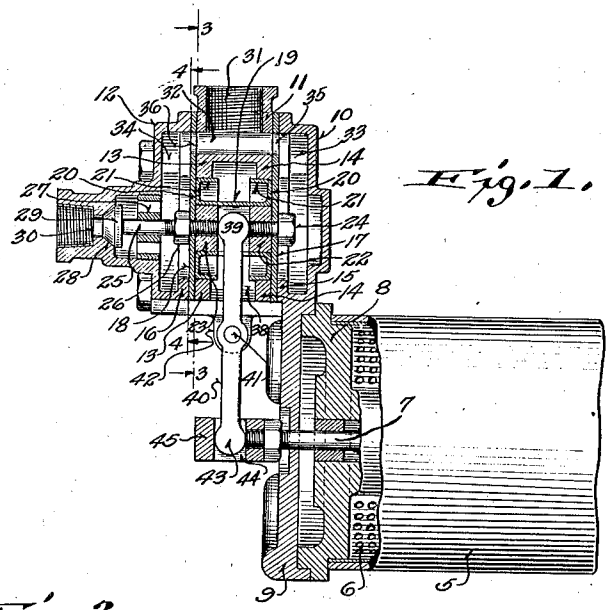


Fig. 1.

Fig. 2.

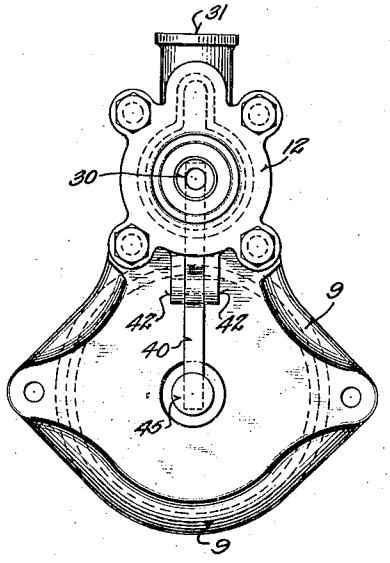


Fig. 3.

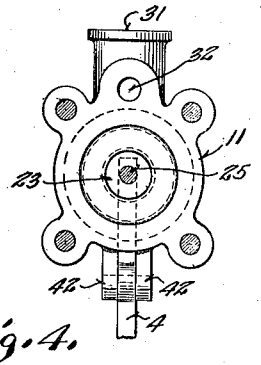
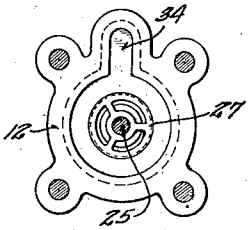


Fig. 4.



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UNITED STATES PATENT OFFICE.

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VALVE FOR REFRIGERATING SYSTEMS.

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This invention relates to valves, and more especially to valves particularly adapted for use with household refrigerating systems, and has for one of its objects to provide a valve for controlling the passage of water or other liquid through such systems.

In refrigerating plants of the household type, ammonia gas is usually employed in a compressed state, and expanded to absorb heat, thereby cooling adjacent parts and freezing water, which is placed in close proximity to the ammonia pipes. After the gas has become heated and expanded, it is returned to a cooling chamber by means of a pipe, which extends through water maintained at as low a temperature as is practicable. This water naturally becomes warm as it absorbs the heat from the ammonia, and eventually becomes too warm to act as a cooling agent for the gas, whereupon it is necessary to discharge the water and to admit fresh cold water.

The valve constituting the present invention is especially adapted for controlling the discharge of this cooling water from the cooling chamber, and is preferably of the thermostatically controlled type, in order that its operation may be automatic.

The primary object of the invention, therefore, is to provide a thermostatically controlled valve, especially adapted for controlling the outlet of the cooling chamber of a refrigerating plant, which valve will be simple in construction, comparatively inexpensive to manufacture, install and maintain, and more efficient in action than those which have been heretofore proposed.

With the above and other objects in view, which will appear as the description proceeds, the invention consists in the novel details of construction and combination and arrangements of parts, more fully hereinafter disclosed and particularly pointed out in the appended claims.

Referring to the accompanying drawings in which like reference characters designate like parts in all the views;

Figure 1 is a central vertical sectional view of a valve constructed in accordance with the present invention, also showing a portion of the operating solenoid;

Fig. 2 is an end elevational view of the parts shown in Fig. 2, as seen from the left of the said figure;

Fig. 3 is an elevational view of the valve shown in Figs. 1 and 2, the solenoid being omitted and the cap member closing one end of the valve casing being omitted to show the interior of the said casing; and,

Fig. 4 is a view similar to Fig. 3, but looking in the opposite direction, and showing the interior of the cap which was omitted in Fig. 3.

Referring more particularly to the said drawings, the numeral 5 indicates a suitable solenoid having a winding 6 and the usual reciprocating core 7, slidably mounted in the end plate 8 with which the solenoid is provided. Suitably secured to the said end plate 8 is a casting 9, constituting a support for the valve, and extending upwardly as indicated at 10, to form a cap or closure member for one end of the valve casing 11, the other end of which is adapted to be closed by a suitable cap 12, as will be clear from the drawings. The said valve casing 11 is provided with the inwardly extending annular flanges 13 and 14, see Fig. 1, while the member 10 is provided with a flange 15, and the member 12 is provided with a flange 16.

Interposed between the said flanges, 14 and 15, is a diaphragm 17 of suitable resiliency, while interposed between the flanges 13 and 16 is a second diaphragm 18 of like construction.

The diaphragms, 17 and 18, are spaced substantially as shown in Fig. 1, by the said flanges, and interposed between the said diaphragms is a sheet metal sleeve 19, the ends of which are flanged outwardly as indicated at 20, which flanges are in turn bent back toward each other, as indicated at 21, forming bearing surfaces adapted to engage the inner surfaces of the flanges 13 and 14.

A pair of washer or filler members, 22 and 23, are positioned within the sleeve member 19, adjacent the diaphragms 17 and 18, respectively, and the member 22 carries an adjusting screw or bolt 24, threaded therein, while the member 23 has threaded in it one end of the valve stem 25, which also carries a locking nut 26, as will be clear from Fig. 1.

The said valve stem 25 is also slidably mounted in a spider member 27, which is threaded or otherwise removably mounted in the cap member 12, which cap member is provided with the valve seat 28, adapted to receive the valve 29, carried by the valve stem 25, as will be readily understood. The said valve controls the outlet passage 30,

from the valve casing, which casing is also provided with an inlet passage 31, communicating by means of the transverse passage 32, with the chambers, 33 and 34, provided in the hollow caps, 10 and 12, as will be clear from Fig. 1. The diaphragms, 17 and 18, are perforated in alignment with the passage 32, as indicated at 35 and 36 respectively, to permit the flow of water from the passage 32 to the chambers 33 and 34.

The lower part of the casing 11 is provided with a slot 38, through which passes one end 39 of a lever 40, which is pivoted as at 41 to the ears 42 with which the valve casing is provided, see Figs. 1, 2 and 3, and the lower end 43 of the said lever extends downwardly to engage the slot 44, provided in the stud 45, carried by the solenoid core 7.

In operation the inlet opening 31 is connected to the cooling chamber of the refrigerating system, which chamber also contains a suitable thermostat, not shown, electrically connected to the solenoid 5. When the water within the cooling chamber becomes too warm, the thermostat will act to close the solenoid circuit, whereupon the core of the solenoid will be moved toward the left, as viewed in Fig. 1, and through its lever connection 40, will tend to move the diaphragms, 17 and 18, the valve stem 25 and valve 29, toward the right, as viewed in the said figure, thereby unseating the valve and permitting the water from the cooling chamber to flow through the passage 32 to the chamber 34, and thence past the valve to the outlet opening 30, from whence it may be discharged at any suitable place by piping not shown.

When the temperature of the water within the cooling chamber has been reduced by the introduction of fresh cold water, to the point where the thermostat will break the solenoid circuit, the resilience of the diaphragms, 17 and 18, will cause the valve 29 to be unseated, the solenoid core 7 moving toward the right, as viewed in Fig. 1. If desired, a suitable spring may be associated with the solenoid core to assist in the seating of the valve.

It will be noted that water is admitted to opposite sides of the diaphragms, 17 and 18, thereby producing a normally balanced valve, and the closing movements of the valve are therefore due solely to the resilience of the diaphragms, or if the auxiliary spring, above mentioned, be employed, to this action also.

While one form of the invention has been illustrated and described it is obvious that those skilled in the art may vary the details of construction as well as the arrangement of parts without departing from the spirit of the invention, and therefore it is not wished to be limited to the above disclosure except as may be required by the accompanying claims.

What is claimed is:

1. In a valve of the class described, a casing provided with a pair of hollow caps closing its ends one of which caps is provided with a valve seat; a diaphragm interposed between said casing and each of said caps; a valve carried by said diaphragms coacting with said seat; a spacing member interposed between said diaphragms and slidably mounted in said casing; and means for moving said diaphragms and valve to unseat the latter.

2. In a valve of the class described, a casing provided with an inlet opening and a transverse passage; a pair of hollow caps closing the ends of said casing, one of which is provided with an outlet opening having a valve seat; a diaphragm having an aperture registering with said passage, interposed between each of said caps and said casing; a spacing sleeve slidably mounted in said casing between said diaphragms; a valve carried by said diaphragms coacting with said seat; and means adapted to be thermostatically controlled for moving said valve.

3. In a valve of the class described, a casing provided with an inlet opening and a transverse passage; a pair of hollow caps closing the ends of said casing, one of which is provided with an outlet opening having a valve seat; a diaphragm having an aperture registering with said passage, interposed between each of said caps and said casing; a spacing sleeve having end flanges slidably mounted in said casing and secured between said diaphragms; a valve carried by said diaphragms coacting with said seat; and means adapted to be thermostatically controlled for moving said valve.

4. In a valve of the class described, a casing provided with an inlet opening and a transverse passage; a pair of hollow caps closing the ends of said casing, one of which is provided with an outlet opening having a valve seat; a diaphragm having an aperture registering with said passage interposed between each of said caps and said casing; a spacing sleeve secured between said diaphragms and provided with outturned end flanges slidably mounted in said casing; a valve provided with a valve stem adjustably carried by one of said diaphragms and adapted to coact with said valve seat; a lever pivotally carried by said casing passing into said sleeve; and electro-magnetic means for moving said lever.

In testimony whereof, I affix my signature.

GEORGE F. KNOX.