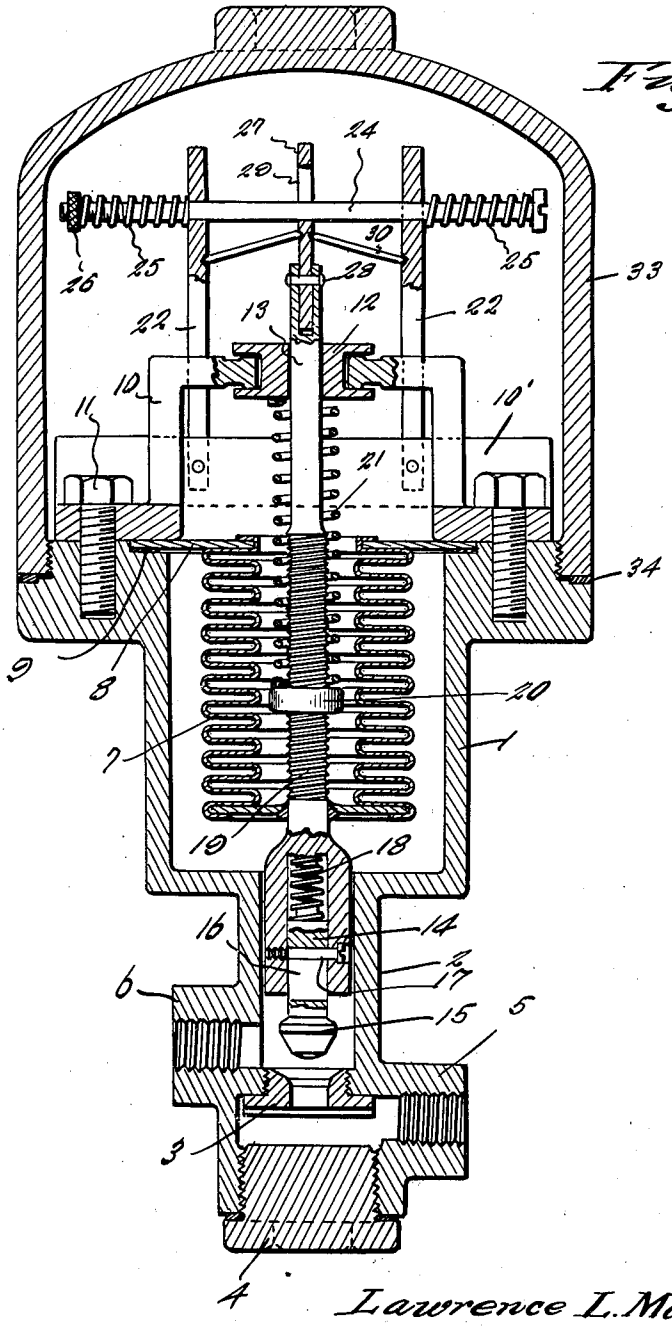
Sept. 19, 1933. L. L. MARKERT 1,927,609

POSITIVE ACTING VALVE

Filed May 23, 1932 2 Sheets-Sheet 1

Fig. 1.



Inventor

Lawrence L. Markert

By Clarence A. O'Brien

Attorney

Sept. 19, 1933. L. L. MARKERT 1,927,609

POSITIVE ACTING VALVE

Filed May 23, 1932 2 Sheets-Sheet 2

Fig. 2.

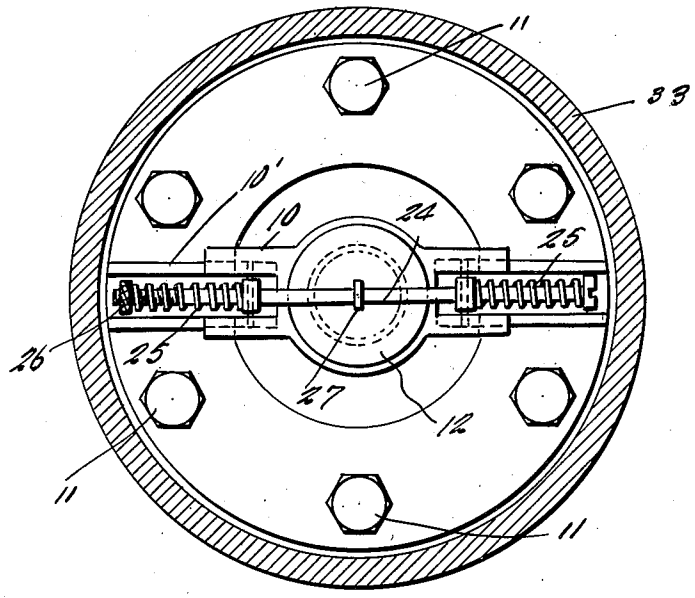


Fig. 3.

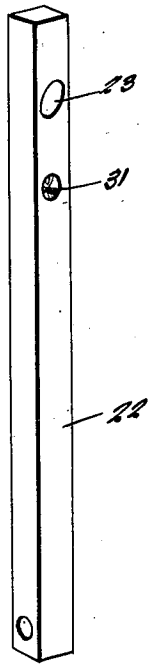


Fig. 4.



Fig. 6.

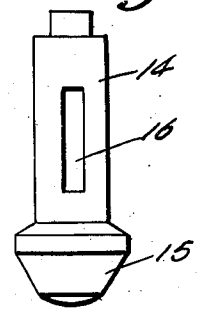
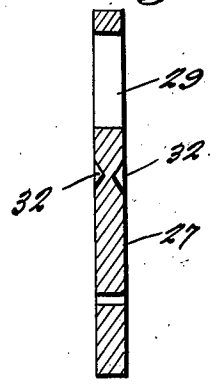


Fig. 5.



Inventor

Lawrence L. Markert

By Clarence O'Brien

Attorney

Patented Sept. 19, 1933 1,927,609

UNITED STATES PATENT OFFICE

1,927,609

POSITIVE ACTING VALVE

Lawrence L. Markert, London, Ontario, Canada

Application May 23, 1932. Serial No. 613,061

3 Claims. (Cl. 137—153)

This invention relates to improvements in valves, mainly designed for the purpose of maintaining different temperatures in two or more separate refrigerators or refrigerated compartments, all operated from one common condensing unit.

The general object of the invention is to provide a positive acting valve for controlling communication between the coil and the compressor of the refrigerator, with means for automatically opening the valve when the temperature reaches a predetermined degree, and then lowering the valve when the temperature reaches normal, with means for adjusting the parts to cause them to operate under desired temperatures.

Another object of the invention is to provide a leak proof cap for enclosing the parts to prevent any leakage from the valve assembly.

This invention also consists in certain other features of construction and in the combination and arrangement of the several parts to be hereinafter fully described, illustrated in the accompanying drawings and specifically pointed out in the appended claims.

In describing the invention in detail, reference will be had to the accompanying drawings, wherein like characters denote like or corresponding parts throughout the several views, and in which:—

Figure 1 is a sectional view through the invention.

Fig. 2 is a horizontal sectional view through the cap with the interior part in plan.

Fig. 3 is a view of one of the supporting bars.

Fig. 4 is a view of one of the governor rods.

Fig. 5 is a longitudinal sectional view through the bar which is connected to the upper end of the plunger rod.

Fig. 6 is a view of the valve.

In these drawings, the numeral 1 indicates the valve body which is formed with a reduced part 2 which forms a chamber for the valve, the bottom of this chamber being threaded to receive the seat forming member 3 which is inserted through an opening in the lower part of the portion 2, this opening being closed by a plug 4.

A nipple 5 is formed on one side of the part 2 for receiving the neck of the compressor and a nipple 6 is arranged at the opposite side for receiving connection to the coil, this nipple 6 being arranged above the valve seat 3 and the nipple 5 below the valve seat.

The bellows is shown at 7 and has its upper end connected to the ring 8 seated on the upper end of the member 1 and provided with a gasket 9 and said ring and gasket are held in place by the clamps and adjusting yokes 10 bolted to the upper ends of the body 1 by the bolts 11. A grooved ring 12 is rotatably supported by the upper end of the yoke and the valve rod 13 passes through this ring and through the bellows, and the bottom of the bellows is fastened to part of this rod. The lower end of the rod is provided with a socket for receiving the shank 14 of the valve 15, the shank being formed with a slot 16 through which a screw 17 is passed, which is carried by the lower end of the rod 13. Thus the valve 15 has a certain amount of movement on the valve rod and is normally held in its lower position by the spring 18 located in the socket and engaging the upper end of the shank of the valve.

The rod 13 is formed with a threaded part 19 to receive a nut 20 against which the lower end of a spring 21 bears, the spring encircling the rod 13 with its upper end bearing against the nut 12. A pair of upright bars 22 are pivoted to the part 10′ of the yoke and clamp member and have holes 23 at its top end to which the long bolt 24 passes. This bolt carries the springs 25, one of which is arranged between one of the upright bars 22 and the head of the bolts between the other parts of the member 22, and the nut 26 and the threaded end of the bolt.

A bar 27 passes between the prongs of the forked upper end of the bar 13 and is pivoted therein as shown at 28 and this bar has a slot 29 therein through which the long bolt 24 passes. A pair of governor rods 30 each having its ends pointed as shown, are placed in uprights 22 and the bar 27 and having their pointed ends engaging the recesses 31 in said upright bars 22 and the recesses 32 in the bar 27.

This valve is of the snap action type and is positive in action. The positive acting operation of the valve is accomplished by the use of the slotted valve stem 14, suspended on operating pin 17 which in turn couples it to valve control plunger rod 13 which is connected to governor connector rod 27 by pin 28. A slot 29 enables rod 13 to move up and down freely without interference with differential adjustment rod or bolt 24.

The slot in stem of operating valve 15 is the factor which determines the positive opening and closing of the valve at a fixed or predetermined setting. That is to say, the operating valve will remain closed until the pressure on the controlled coil side of the valve has reached a point sufficiently great to compress bellows 7 and temperature adjusting spring 21 to a height where the differential rods 30 break past the absolute hori-

zontal position. At this point, the tension caused by differential adjusting springs 25, will cause valve control plunger rod 13 to snap upward to a height where the bottom of the slot in governor connector bar 27 is in contact with rod or bolt 24.

At the instant when the differential governors break past the absolute horizontal position, the valve operating pin 17 comes in contact with the top of the slot in the operating valve, opening the valve a distance equal to the distance travelled by the plunger rod 13 after the differential governor rods 30 have passed absolute horizontal. The bellows is now in a compressed position.

After the pressure on the controlled coil side of the operating valve has been reduced to a point approaching the closing setting of the valve, the valve control plunger rod 13 starts moving downward, and as the coil pressure continues to be reduced, the valve control plunger rod likewise continues its downward movement carrying with it the operating valve.

At the instant when the governor rods reach absolute horizontal, the operating valve will become closed. Immediately, the governor rods reach a point below absolute horizontal, the tension exerted by differential adjusting springs 25 will cause the valve control plunger rod to snap downward, forcing the operating valve tightly against the valve seat. The downward movement of the valve control plunger rod will be checked when the top of the slot in the governor connector rod 27 comes in contact with differential rod 24. It is well to note here that the operating valve is closed before the valve control plunger rod snaps downward, thereby eliminating hammering on the valve seat.

The auxiliary valve seat spring 18 serves a dual purpose in the valve, firstly, it helps to absorb the shock caused by the downward snap of the valve control plunger rod, and secondly, (but most important) it holds the operating valve 15 tightly to the valve seat during the upward movement of the valve control plunger rod and until the governor rods break past absolute horizontal, when the valve is snapped open. The valve is so designed that the oil drainage from the controlled coil will collect around the operating valve seat, thereby increasing the efficiency possibilities of the already perfectly seating valve.

The differential adjustment is regulated by the differential nut 26. By turning this nut to the right, it is possible to place more tension on the differential adjusting springs 25 and consequently on the differential governors 30. More tension on governors 30 means more pressure is required to break past absolute horizontal. Less tension, which is obtained by turning differential adjusting nut 26 to the left, means less pressure is required to break differential governors past absolute horizontal. Consequently, turning nut 26 to the right increases differential, turning to the left decreases differential.

Temperature adjustment is obtained by turning temperature adjusting nut 12 which in turn moves temperature tension adjusting nut 20 upwardly and downwardly on valve control plunger rod 13, which automatically increases or decreases the tension on temperature adjusting spring 21. Turning the nut 12 into the right will lower the temperature, and turning the nut 12 into the left, will raise the temperature.

The precautionary sealing methods incorporated in this valve to prevent the possibility of gas leaks when the refrigeration system is working on a pressure, and to eliminate the danger of drawing air into the refrigeration system when working on a vacuum, are worthy of very special mention. The sealing devices employed are decidedly superior and different from those used in any valve heretofore marketed. The superiority of the faultless sealing distinguishes the valve in that an auxiliary leak-proof sealing cap 33 is used in addition to the regular seal made possible by the pressure exerted on bellows sealing gasket 9 by the bellows flange, when the cap screws are tightened down. This is a seal in itself where the possibility of leaks are very meagre, but I provide a second and faultless sealing apparatus consisting of the auxiliary leak proof sealing cap 33, the bottom of which is machined by a smooth true surface, and which is screwed down on gasket 34 which seats on another smooth machined recess in the valve body 1 so that when the auxiliary leakproof sealing cap is tightly screwed down, the danger of gas escaping from the system, or air entering the system is entirely eliminated.

Due to the design of this device with its removal of the possibility of the operating valve hammering on the valve seat, it will rarely, if ever, be necessary to replace either the operating valve 15 or the operating valve seat assembly 3. Should it for any reason be found necessary to remove the operating valve seat assembly it is a very simple operation. The operating valve seat assembly is also removable and is fitted with a machined slot which makes it possible to remove the assembly with a wide screw driver.

The valve inlet and outlet openings will be tapped with a standard pipe tap in order that any style of brass fittings may be used therein. This makes possible the use of variable sizes of brass fittings to accommodate the particular size of suction line which it is desired to use.

It is thought from the foregoing description that the advantages and novel features of the invention will be readily apparent.

It is to be understood that changes may be made in the construction and in the combination and arrangement of the several parts provided that such changes fall within the scope of the appended claims.

Having thus described my invention, what I claim as new is:—

1. A device of the class described comprising a valve body having an inlet and outlet at its lower end, a valve seat located between said inlet and outlet, a bellows located in the valve body, a valve rod passing through the bellows and connected therewith, a valve movably connected with the lower end of the rod, a spring for normally holding the valve in its lowered position, adjustable spring means for resisting upward movement of the valve rod, an adjustable means for resisting initial closing and opening movement of the valve and its rod, said means comprising a pair of vertically arranged bars pivotally connected to a part of the valve body at the lower end, a rod passing through the upper end of said bars and having a head at one end and a nut at the other end, springs arranged on said rod, one between one of the upwardly extending bars and the head and the other between the other upwardly extending bar and the nut, a member connected with the upper end of the valve rod and having a slot therein through which the rod passes, and pointed bars having their inner ends engaging recesses in said member, and pointed outer ends engaging recesses in the upwardly extending bars.

2. A device of the class described comprising a valve body having an inlet and outlet at its lower end, a valve seat located between said inlet and outlet, a bellows located in the valve body, a valve rod passing through the bellows and connected therewith, a valve movably connected with the lower end of the rod, a spring for normally holding the valve in its lowered position, adjustable spring means for resisting upward movement of the valve rod, an adjustable means for resisting initial closing and opening movement of the valve and opening its rod, said means comprising a pair of vertically arranged bars pivotally connected to a part of the valve body at the lower end, a rod passing through the upper end of said bars and having a head at one end and a nut at the other end, springs arranged on said rod, one between one of the upwardly extending bars and the head and the other between the other upwardly extending bar and the nut, a member connected with the upper end of the valve rod and having a slot therein through which the rod passes, pointed bars having their inner ends engaging recesses in said member and pointed outer ends engaging recesses in the upwardly extending bars, a seal between the upper end of the bellows and the valve body, a cap threaded to the valve body and enclosing the parts carried thereby and a gasket between the cap and the valve body for forming the second seal.

3. A device of the class described comprising a body having a bellows chamber in its upper part and a reduced part forming a small chamber, a valve seat in the bottom of said small chamber and removably arranged therein, an inlet connected with the small chamber, an outlet in communication with a part of the body below the valve seat, a valve rod having a socket in its lower end, a valve having a slotted stem extending into the socket, a pin carried by the socket part and passing through a slot, a spring in the socket for normally holding the valve in its lowered position, a bellows in said chamber connected with the valve rod, a seal between the top of the bellows and the body, a nut threaded on the valve rod, a member rotatably supported above the valve body, a spring encircling the valve rod and located between the first member and the nut, upwardly extending member connected with the upper end of the valve rod and having a slot therein, and oppositely arranged recesses therein below the slot, a pair of bars having their lower ends pivotally supported from the top part of the valve body and having holes in their upper portions, a long bolt passing through the holes and having a head at one end and a threaded part at its other end, said bolt also passing through the slot in the upwardly extending member, said upwardly extending bars having recesses on their inner faces, a pair of pointed bars having their inner ends engaging the recesses in the slotted member and their outer ends engaging the recesses in the upwardly extending bars, a pair of springs on the long bolt, one located between an upwardly extending bar in the head of the bolt, and the other between the other upwardly extending bar and the nut, a cap having its lower end threaded into the top part of the body and a gasket between a part of the body and the lower edge of the cap.

LAWRENCE L. MARKERT.