F. N. ROEHRICH.

CONDENSER WATER VALVE.

APPLICATION FILED JUNE 2, 1910.

1,172,739.

Patented Feb. 22, 1916.

Fig. 1

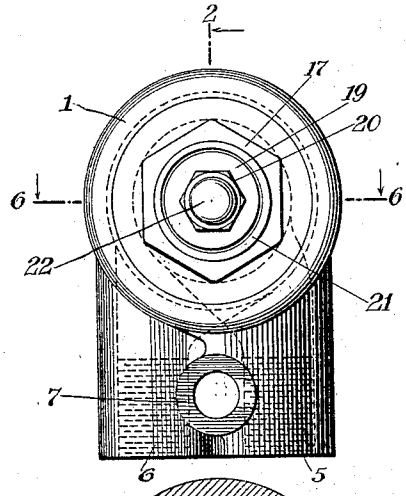


Fig. 2

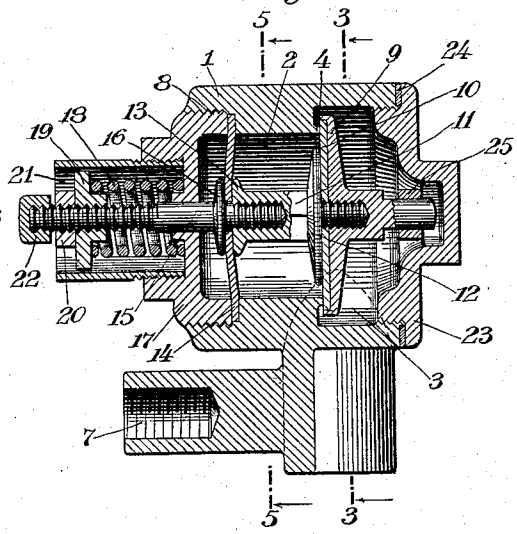


Fig. 3

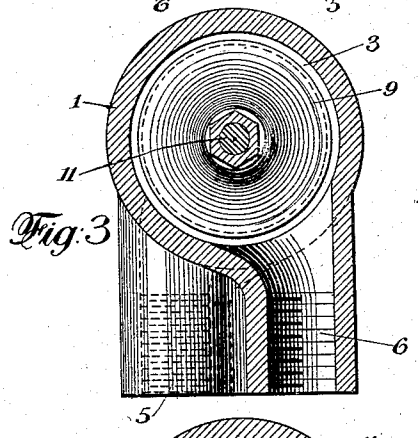


Fig. 4

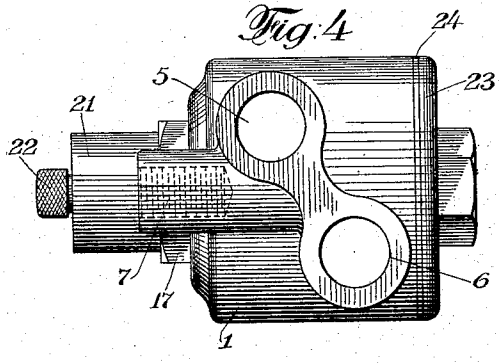


Fig. 5

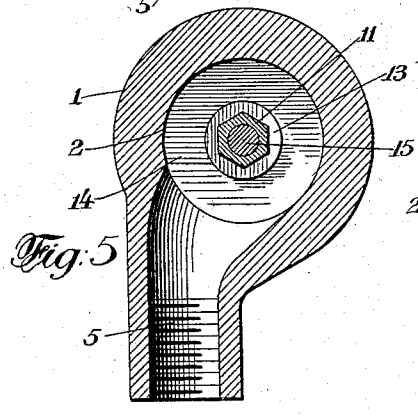
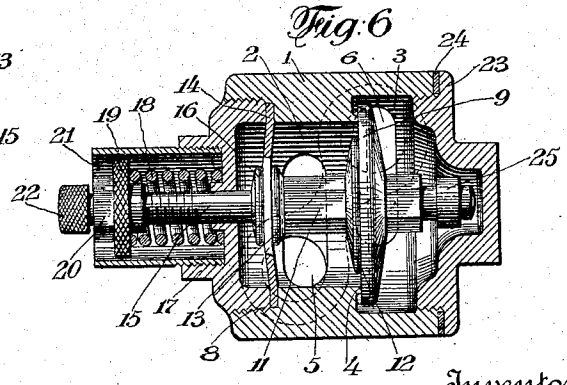


Fig. 6



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UNITED STATES PATENT OFFICE.

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CONDENSER WATER-VALVE.

1,172,739. Specification of Letters Patent. Patented Feb. 22, 1916.

Application filed June 2, 1910. Serial No. 564,580.

To all whom it may concern:

Be it known that I, FRANK N. ROEHRICH, a citizen of the United States, residing at Jersey City, in the county of Hudson and State of New Jersey, have invented a new and useful Condenser Water-Valve, of which the following is a specification.

My invention relates to improvements in valves tending to close but opening so long as power is applied to cause an open condition. My purpose is to construct such a valve that will be simple, compact and easy of operation and that will not clog at the seat nor be liable to bind at any moving part. My purpose further is to make such a valve adapted for use in controlling the condensing water of an automatic refrigerating machine. The means employed for accomplishing these purposes are disclosed in the accompanying drawings and in the description relating thereto.

In the drawings Figure 1 is a left end elevation of my invention. Fig. 2 is a vertical section through the line 2— of Fig. 1, looking toward the left, some of the inner parts, however, being in elevation. Fig. 3 is a vertical section through the line 3—3 of Fig. 2, looking toward the left. Fig. 4 is a bottom view of the valve. Fig. 5 is a vertical section through the line 5—5 of Fig. 2, looking toward the left. Fig. 6 is a horizontal section through the line 6—6 of Fig. 1, looking from above, most of the inner parts, however, being in plan view.

A casing 1 has a cylindrical inlet chamber 2— of relatively lesser diameter, a cylindrical outlet chamber 3 of relatively greater diameter adjacent to said former chamber and concentric with it, a narrow rimlike valve seat 4 in a substantially vertical plane projecting from the casing wall at the end of the inlet chamber into the outlet chamber, an inlet passage 5 leading from beneath upward into the inlet chamber and internally threaded at its lower end, and an outlet passage 6, parallel with the inlet passage, leading from the outlet chamber and threaded at its lower end. Cast integral with the casing 1 on its under side is a supporting bracket 7, extending toward the left as seen in Figs. 2 and 4 and having in it a threaded recess. The casing 1, at the left of the chamber 2, as seen in Figs. 2 and 6, has an annular diaphragm recess 8, internally threaded at its outer end; and, at the right of the chamber 3 as so seen, the casing is open and internally threaded.

While the chamber 2 is referred to as the inlet chamber and the chamber 3 as the outlet chamber, and while the passage 5 is referred to as the inlet passage and the passage 6 as the outlet passage, it is evident that the inlet passage and chamber may be used as the outlet passage and chamber and that, conversely, the outlet passage and chamber may be used as the inlet passage and chamber.

Within the chamber 3 is a valve disk 9 axially perforated and threaded in its side toward the seat 4, having a hub on its side away from the seat, through part of which the perforation continues, of hexagonal form on the outside for part of its length and ending in a short reciprocating rod of small diameter. The disk 9 toward the seat 4 also has a rim of a little greater diameter than the seat so as to contain a leather disk 10 adapted for seating on being pressed upon the seat. Passing through the disk 10 and screwed into the perforation of the disk 9 is the screw end of a spacing piece 11, having a clamping washer 12, within the chamber 2 and of a little less diameter than that chamber, that firmly holds the disk 10 against the disk 9. The piece 11 also has a diaphragm washer 13 toward the other end of its containing chamber, is of hexagonal form between the washers 12 and 13 and has a threaded perforation from its end toward the recess. Seated in the recess 8 is a diaphragm 14, preferably of rubber, although it may be of copper, if very thin. Passing through the diaphragm 14 and screwed into the perforation of the piece 11 is the threaded end of a motor rod 15, having a washer 16 just outside the diaphragm 14 so as to firmly compress the diaphragm between itself and the washer 13 when the rod is screwed into place and thus to make a water tight joint.

Screwed into the recess 8 so as to compress the diaphragm 14 and thus to make a water tight joint is an end piece 17, having a hexagonal outer section, having an axial perforation through which the rod 15 can freely reciprocate, having an outside recess internally threaded and having a rim around the outside of the perforation. A helical closing spring 18 surrounds the rod 15 and at one end abuts against the piece 17 around

its rimmed perforation. The rod 15 is threaded from its outer end nearly as far as the part which reciprocates through the perforation in the piece 17. Threaded on to the rod at a little distance from its outer end is a milled adjusting nut 19, bearing against the outer end of the spring 18 for compressing it as much as may be desired and having an inner unmilled part of much less diameter and fitting inside the spring. A lock nut 20 holds the nut 19 in place. Screwed into the recess of the piece 17 is a sleeve 21 for protecting the rod 15, the spring 18 and the nut 19. Threaded on to the extreme outer end of the rod 15 is a milled motor head 22. Screwed into the casing 1 and forming the end of the chamber 3 is a head 23, compressing any kind of water tight gasket 24 at the end of the casing and having a hexagonal nut formed on its outer end. At the center of the inside of the head 23 and cast integral therewith is a guide spider 25 in which is the rod end of the disk 9. The spider permits of a reciprocating fit of the rod end and there is enough free space on the inside of the head 23 for the disk 9 to reciprocate sufficiently to open the valve. The open spaces between the arms of the spider 25 prevent the accumulation of sediment in the head 23.

The method of operation is as follows: It is assumed that the casing 1 is supported by some kind of rod screwed into the bracket 7. It is also first assumed that a water supply pipe is connected with the passage 5 and that a pipe leads from the passage 6 to a series of cooling pipes in the condenser of a refrigerating machine, either of the absorption or of the compression type. It is also assumed that when the kinetic energy of the gas particles in the condenser, as manifested by a rise both of temperature and pressure, reaches a certain predetermined limit, certain mechanism will operate to force the head 22 inward. The head 22 also may be pressed inward by hand. Upon either such inward movement of the head 22, the nut 19 compresses still more the spring 18; the rod 15 bends the diaphragm 14 inward within the chamber 2; and the piece 11 forces the disks 10 and 9 inward within the chamber 3, the rod end of the disk 9 reciprocating in the spider 25. With the lifting of the disk 10 off of the seat 4, the valve is opened and continues to be open as long as the head 22 is held in its inward position. But with the removal of the hand or of the assumed mechanism from the head 22, the spring 18 at once acts on the nut 19 so as to seat the disk 10 and thus to close the valve. This quickness of the closing of the valve depends on the thrusting force of the spring 18 and that force is regulated by screwing the nut 19 inward or outward.

It will be observed that, as the chamber 2 is of practically uniform diameter, the pressure effect of the water supply in this chamber on the washer 12 and the disk 10 at all times approximately equals the pressure effect of the water supply on the washer 13 and the diaphragm 14; and that the force necessary to open the valve is approximately only such as is necessary to compress the spring 18. Any excess pressure of the water supply tending to open the valve would be counteracted by the spring 18. All parts of the valve are of simple construction and are easily accessible in case adjustments or repairs are needed. The valve operates equally well in any position; but, if it is positioned with its axis horizontal, no sediment can accumulate in the chambers 2 and 3. By constructing the valve to open outward into the chamber 3 instead of inward into the chamber 2, a check valve effect is secured which is also useful under some circumstances.

In case the passage 6 is used as the inlet and the passage 5 as the outlet, the pressure of the water entering the chamber 3 will reinforce the spring 18 in the tendency of the latter to close the valve and the force to be applied to the head 22 to open the valve must therefore be sufficient to overcome the spring and the head of the water entering the passage 6. In this use of the valve, it will not be balanced, but it will possess all the other advantages that have been indicated.

What I have invented and what I desire to have protected by Letters Patent is expressed in claims as follows:

I claim:

1. In combination a chamber casing having an inlet, an outlet and a valve seat between them, a check valve adapted to close said seat, a diaphragm forming one end of said casing on the inlet side of said valve and presenting to the pressure of the fluid between itself and said valve an area approximately equal to the area of the valve also so presented when the valve is closed, a stem opening said valve on an inward thrust of said diaphragm, and a spring device tending to close said valve.

2. In combination a chamber casing having an inlet, an outlet and a valve seat between them, a check valve adapted to close said seat, a diaphragm forming one end of said casing on the inlet side of said valve and presenting to the pressure of the fluid between itself and said valve an area approximately equal to the area of the valve also so presented when the valve is closed, a stem opening said valve on an inward thrust of said diaphragm, a spring device tending to close said valve and resisting such thrusting up to a predetermined limit, and means for adjusting the force of said device.

3. In combination a chamber casing having an inlet, an outlet and a valve seat between them, a check valve adapted to close said seat, a diaphragm forming one end of said casing on the inlet side of said valve and presenting to the pressure of the fluid between itself and said valve an area approximately equal to the area of said valve also so presented when the valve is closed, a connecting member connecting said diaphragm and valve, extending outside of the diaphragm and opening the valve on being thrust inward, and a spring device outside of said casing and acting on the outer part of said member so as to tend to close the valve.

4. In combination a chamber casing having an inlet, an outlet and a valve seat between them, a check valve adapted to close said seat, a diaphragm forming one end of said casing on the inlet side of said valve and presenting to the pressure of the fluid between itself and said valve an area approximately equal to the area of said valve also so presented when the valve is closed, a connecting member connecting said diaphragm and valve, extending outside of the diaphragm and opening the valve on being thrust inward, a spring device outside of said casing and acting on the outer part of said member so as to tend to close the valve, and means for adjusting the force of said device.

5. In combination a chamber casing having an inlet, an outlet and a valve seat between them, a reciprocating valve adapted to close said seat and having a guide rod extending from its side away from the seat, an end piece closing one end of said casing and having on its inside a guiding spider in which said rod reciprocates, a diaphragm forming the other end wall of said casing, a connecting member connecting said diaphragm and valve, extending outside of the diaphragm, having an enlargement on its outer part and opening the valve on being thrust inward, an outer casing clamping the edges of said diaphragm to said chamber casing, and a compression spring bearing at opposite ends against said outer casing and said enlargement.

6. In combination a chamber casing having an inlet, an outlet and a valve seat between them, a reciprocating valve adapted to close said seat and having a guide rod extending from its side away from the seat, an end piece closing one end of said casing and having on its inside a guiding spider in which said rod reciprocates, a diaphragm forming the other end wall of said casing, a connecting member connecting said diaphragm and valve, extending outside of the diaphragm, having an enlargement on its outer part and opening the valve on being thrust inward, an outer casing clamping the edges of said diaphragm to said chamber casing, a compression spring bearing at opposite ends against said outer casing and said enlargement, and means for adjusting the force of said spring.

7. In combination a chamber casing having an inlet, an outlet and a valve seat between them, a check valve adapted to close said seat, a diaphragm forming one end of said casing on the inlet side of said valve and presenting to the pressure of the fluid between itself and said valve an area approximately equal to the area of the valve also so presented when the valve is closed, a connecting member connecting said diaphragm and valve, extending outside of the diaphragm, having an enlargement on its outer part and opening the valve on being thrust inward, an outward casing clamping the edges of said diaphragm to said chamber casing, and a compression spring bearing at opposite ends against said outer casing and said enlargement.

8. In combination a chamber casing having an inlet, an outlet and a valve seat between them, a check valve adapted to close said seat, a diaphragm forming one end of said casing on the inlet side of said valve and presenting to the pressure of the fluid between itself and said valve an area approximately equal to the area of the valve also so presented when the valve is closed, a connecting member connecting said diaphragm and valve, extending outside of the diaphragm, having an enlargement on its outer part and opening the valve on being thrust inward, an outer casing clamping the edges of said diaphragm to said chamber casing, a compression spring bearing at opposite ends against said outer casing and said enlargement, and means for adjusting the force of said spring.

9. In combination a chamber casing having an inlet, an outlet and a valve seat between them, a check valve adapted to close said seat, a diaphragm forming one end of said casing and presenting to the pressure of the fluid between itself and said valve an area approximately equal to the area of said valve also so presented when the valve is closed, a stem connecting said valve and diaphragm and accessible to the inward thrust of a reciprocating member, and a spring device tending to close said valve.

10. In combination a chamber casing having an inlet, an outlet and a valve seat between them, a check valve adapted to close said seat, a diaphragm forming one end of said casing, and presenting to the pressure of the fluid between itself and said valve an area approximately equal to the area of said valve also so presented when the valve is closed, a stem connecting said valve and diaphragm, projecting outward from the diaphragm and accessible at its outer end

to the inward thrust of a reciprocating member, and a spring device tending to close said valve.

11. In combination a chamber casing having an inlet, an outlet and a valve seat between them, a check valve adapted to close said seat, a diaphragm forming one end of said casing and presenting to the pressure of the fluid between itself and said valve an area approximately equal to the area of said valve also so presented when the valve is closed, a stem connecting said valve and diaphragm and projecting outward from the diaphragm, and a spring device operative upon the outer end of said stem and thereby tending to close said valve.

12. In combination a chamber casing having an inlet, an outlet and a valve seat between them, a check valve adapted to close said seat, a diaphragm forming one end of said casing and presenting to the pressure of the fluid between itself and said valve an area approximately equal to the area of said valve also so presented when the valve is closed, a stem connecting said valve diaphragm and projecting outward from the diaphragm, a spring device tending to close said valve, and an outer casing clamping the edges of said diaphragm to said chamber casing and leaving exposed beyond itself the outer end of said stem.

13. In combination a chamber casing having an inlet, an outlet and a valve seat between them, a check valve adapted to close said seat, a diaphragm forming one end of said casing and presenting to the pressure of the fluid between itself and said valve an area approximately equal to the area of said valve also so presented when the valve is closed, a stem connecting said valve and diaphragm, projecting outward from the diaphragm and having an enlargement near its outer end, an outer casing clamping the edges of said diaphragm to said chamber casing, and a compression spring bearing at opposite ends against said outer casing and said enlargement.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."