S. Z. NICHOLS.

AIR COMPRESSOR VALVE.

APPLICATION FILED FEB. 3, 1916.

1,291,609. Patented Jan. 14, 1919.

Fig. 1.

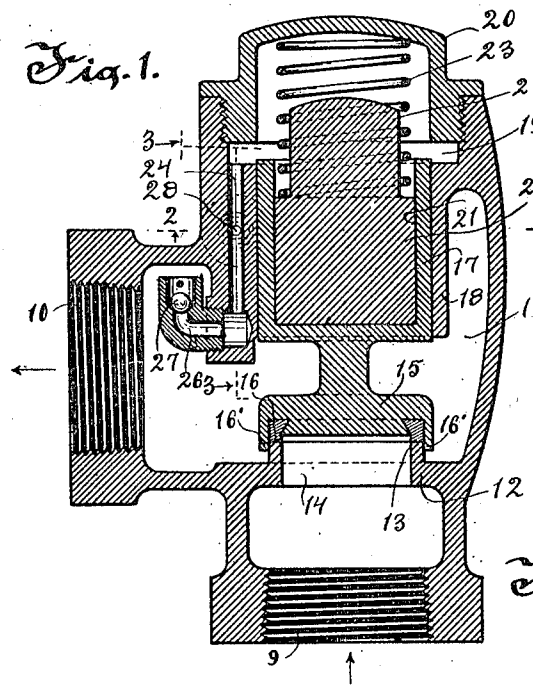


Fig. 2.

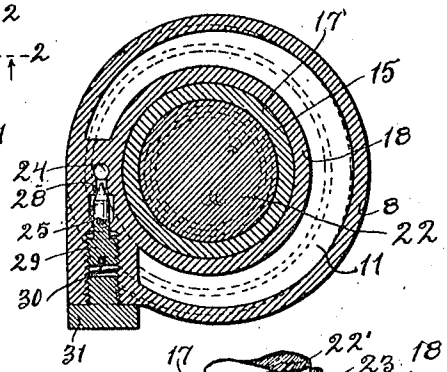


Fig. 3.

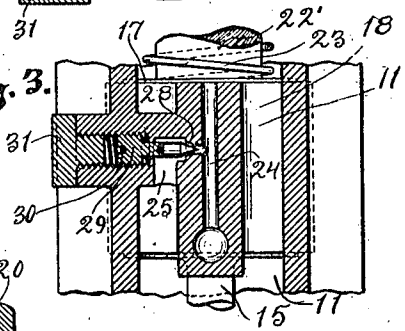
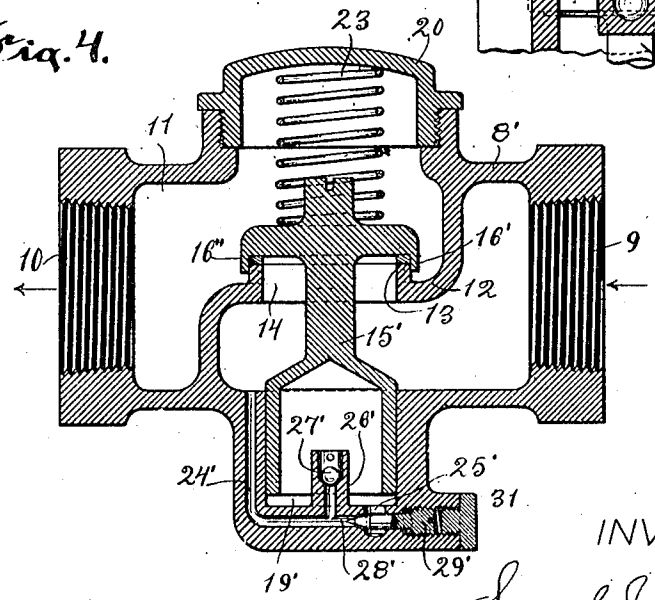


Fig. 4.



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AIR-COMPRESSOR VALVE.

1,291,609. Specification of Letters Patent. Patented Jan. 14, 1919.

Application filed February 3, 1916. Serial No. 75,891.

To all whom it may concern:

Be it known that I, SAMUEL Z. NICHOLS, a citizen of the United States, and resident of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Air-Compressor Valves, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

This invention relates to improvements in air compressor valves more particularly adapted for use in connection with compressed air apparatus, but is not necessarily limited thereto.

It is one of the objects of the present invention to provide an air compressor valve in the form of a check valve which will open quickly and close slowly and which may be adjusted to close more or less slowly.

A further object of the invention is to provide an air compressor valve so constructed as to prevent pounding or rattling which is ordinarily caused by the vibration of the valve.

A further object of the invention is to provide an air compressor valve having a check valve and a needle valve for controlling the main valve member of the valve.

A further object of the invention is to provide an air compressor valve which is of simple construction, is strong and durable and is well adapted for the purpose described.

With the above and other objects in view the invention consists of the improved air compressor valve and its parts and combinations as set forth in the claims and all equivalents thereof.

In the accompanying drawing in which the same reference characters indicate the same parts in all of the views:

Figure 1 is a vertical central sectional view of the improved air compressor valve;

Fig. 2 is a transverse sectional view thereof taken on line 2—2 of Fig. 1;

Fig. 3 is a vertical sectional detail view taken on line 3—3 of Fig. 1; and

Fig. 4 is a vertical sectional view of a modified form of valve.

Referring to the drawing the numeral 8 indicates the valve casing of an angular form of valve in which 9 is the receiving end, 10 the discharge end, 11 the valve chamber and 12 a horizontal partition partly dividing the inlet opening from the valve chamber. The partition 12 is provided with an upstanding annular valve seat flange 13 which surrounds a central opening 14 in the partition and forms a seat for the piston valve 15 positioned in said valve casing. The valve 16 proper of said piston valve is formed preferably of a softer metal than the valve to form an air tight joint with the valve seat when in closed position. The face of the valve is recessed to form the overlapping and depending annular flange 16′ to form a more gradual opening of the valve opening 14 and causing the valve to travel farther before opening thereby displacing more fluid in chamber 19, also flange 16′ has the tendency to keep dirt or grit from coming in direct contact with the valve seat.

The piston portion 17 of the valve is of tubular form and reciprocates in the depending cylindrical portion 18 of the valve casing. The cylindrical portion in connection with the piston portion forms an air chamber 19 which is closed at its upper open end by a cap 20 threaded into the valve casing.

It will be noted that the valve seat and the valve are of less diameter than the bore of the cylindrical portion of the casing and in axial alinement therewith so that the cylinder and valve may be drilled and finished at the same time and as the parts are in alinement less work will be required in fitting the valve and forming a tight joint.

The bore 21 of the piston is preferably filled with a turned block of wood 22 having a reduced upper end portion 22′ to receive the lower convolutions of a coiled spring 23 which is interposed between the filler 22 and the casing cap 20 and which serves to yieldingly hold the piston valve 15 on its seat.

The air chamber 19 is in communication with the valve chamber 11 by means of a checked passageway or duct 24 and a controlled branch passageway or duct 25. The passageway 24 extends at right angles into the valve chamber and has an angled supplemental check valve casing 26 threaded into the casing at the lower end of said passageway and a ball check valve 27 of said supplemental casing permits the free egress of air from the air chamber but prevents the ingress of air thereto so that the air displaced by the upward movement of the piston valve will be discharged from the air chamber through the checked passageway.

The passageway 25 extends parallel to the checked passageway 24 and near its upper end is connected to said checked passageway 24 by a cross duct or passageway 28 which extends exteriorly of the casing. A needle valve 29 adjustably threaded in said cross duct 28 seems to control the air flowing through said air duct and into the air chamber so that the downward or closing movement of the valve may be controlled, the partial vacuum created in the air chamber by the downward movement of the piston valve holding the valve in open position until relieved by the incoming air from the needle valve controlled cross duct.

The needle valve is provided with a slotted end portion 30 for convenience in adjusting the valve and the outer end of the cross duct is closed by a cap screw 31 threaded into said cross duct and which is removed when it is desired to adjust the valve.

In use air pressure in the intake side of the valve when in excess of the pressure on the other side of the valve will cause said valve to open and to remain open until the pressure is substantially equalized due to the retarded closing of the valve.

In the modified form shown in Fig. 4 the valve casing 8′ is in the form of a straight way valve and the air piston 17′ and the air chamber 19′ are positioned beneath the valve 16″ proper. The supplemental check valve casing 26′ and its ball valve 27′ extend into the air chamber 19′ and a passageway 25′ in communication with the supplemental valve 26′ and the valve chamber 11 permits air to freely enter said air chamber when the piston valve is moved upwardly to open position. A continuation 28′ of this passageway communicates with the air chamber at another point as indicated by the numeral 25′ and the entrance of air into the air chamber is controlled by the needle valve 29′.

As the other parts of the modified form are substantially the same as the first form it is unnecessary to again mention all of the parts.

The operation of the modified form is similar to the first mentioned form with the exception that when the valve opens air is drawn into the air chamber and in closing the air in said chamber is slowly discharged and controls the closing of the valve whereas in the first mentioned form the air is slowly admitted into the air chamber to control the closing of the valve.

From the foregoing description it will be seen that the air compressor valve is of very simple construction and is well adapted for the purpose described.

What I claim as my invention is:

1. A valve, comprising a casing having an inlet and an outlet opening and a valve chamber interposed between the two openings, said casing also having a capped opening and an air chamber formed therein, a piston valve controlling the flow between the inlet opening and the valve chamber and extending into and separating the valve chamber from the air chamber, said piston valve being in axial alinement with the capped opening and removable therethrough, a check valve in communication with the air chamber and the valve chamber for retarding the free movement of the piston valve in one direction, and a valve in communication with the air chamber and the valve chamber for controlling the movement of the piston valve toward closed position.

2. A valve, comprising a casing having an inlet and an outlet opening and a valve chamber interposed between the two openings, said casing also having a capped opening and an air chamber formed therein and passageways between the air chamber and the valve chamber, a piston valve controlling the flow between the inlet opening and the valve chamber and extending into the air chamber and being controlled thereby and separating the air chamber from the valve chamber, said piston valve being in axial alinement with the capped opening and removable therethrough, a check valve controlling one of said passageways, and an adjustable valve controlling the other passageway.

3. A valve, comprising a casing having an inlet and an outlet opening and a valve chamber interposed therebetween, said casing also having a cylindrical portion depending into the valve chamber to form an air chamber thereabove and said casing also having a capped opening and communicating passageways between the air chamber and the valve chamber, a piston valve slidably extending into the cylindrical portion and separating the air chamber from the valve chamber and having a lower valve portion, said piston valve being in axial alinement with the capped opening and removable therethrough, the lower portion of the valve chamber having a valve seat which is engaged by the valve portion, spring means normally holding the valve in closed position, a check valve in communication with one of the passageways for retarding the free movement of the piston valve toward closed position, and an adjustable valve entering the other passageway for controlling the movement of the piston valve toward closed position.

4. A valve, comprising a casing having an inlet and an outlet opening and a valve chamber interposed therebetween, said casing also having a capped opening and a cylindrical portion in axial alinement therewith and depending into the valve chamber to form an air chamber beneath the cap and said casing also having communicating pas-

sageways between the air chamber and the valve chamber, a piston valve slidably extending into the cylindrical portion and separating the air chamber from the valve chamber and having a lower valve portion in axial alinement with the piston portion, the lower inlet portion of the valve chamber having a valve seat of less diameter than the cylindrical portion and also in axial alinement therewith which is engaged by the valve portion, spring means normally holding the valve in closed position, a check valve mounted within the valve chamber at the outlet end of one of the passageways for retarding the free movement of the piston valve toward closed position, and a needle valve entering the other passageway for controlling the movement of the piston valve toward closed position.

5. A valve, comprising a casing having an inlet and an outlet opening and a valve chamber interposed therebetween, said casing also having a capped opening and a cylindrical portion in axial alinement therewith and depending into the valve chamber to form an air chamber beneath the cap and said casing also having communicating passageways between the air chamber and the valve chamber, a piston valve slidably extending into the cylindrical portion and separating the air chamber from the valve chamber and having a lower valve portion in axial alinement with the piston portion, said piston valve being removable through the cylindrical portion and the capped opening, the lower inlet portion of the valve chamber having a valve seat which is engaged by the valve portion, spring means normally holding the valve in closed position, a check valve mounted within the valve chamber at the outlet end of one of the passageways for retarding the free movement of the piston valve toward closed position, a threaded opening intersecting the other passageway and extending to the exterior portion of the valve casing, and a threaded needle valve entering the threaded opening and the last mentioned passageway for controlling the movement of the piston valve toward closed position.

6. A valve, comprising a casing having an inlet and an outlet opening and a valve chamber interposed therebetween, said casing also having a cylindrical portion depending into the valve chamber to form an air chamber thereabove and said casing also having a capped opening and communicating passageways between the air chamber and the valve chamber, a piston valve slidably extending into the cylindrical portion and separating the air chamber from the valve chamber and having a lower valve portion in axial alinement with the piston portion, said piston valve being removable through the capped opening, the lower inlet portion of the valve chamber having a valve seat which is engaged by the valve portion, means normally holding the valve in closed position, a check valve mounted within the valve chamber at the outlet end of one of the passageways for retarding the free movement of the piston valve toward closed position, a threaded opening intersecting the other passageway and extending to the exterior portion of the valve casing, a needle valve threaded into the threaded opening and entering the last mentioned passageway for controlling the movement of the piston valve toward closed position, and a cap screw threaded into the threaded opening.

7. A valve, comprising a casing having an inlet and an outlet opening and a valve chamber interposed therebetween, said casing also having an open top and a cylindrical portion depending into the valve chamber to form an air chamber thereabove and said casing also having vertically extending communicating passageways between the air chamber and the valve chamber and a transverse threaded opening in communication with both passageways and extending to the exterior portion of the casing, the lower end portion of one of the passageways extending toward the outlet opening of the casing, a cap covering the open top of the casing, a piston valve slidably extending into the cylindrical portion of the casing and separating the air chamber from the valve chamber and having a lower portion in axial alinement with the piston portion and having a depending annular flange, said piston valve being removable through the capped top opening, the lower inlet portion of the valve chamber having an upstanding valve seat which is overlapped and engaged by the valve portion, an angular check valve threaded into the passageway which extends toward the outlet opening of the casing for retarding the free movement of the piston valve toward closed position, a needle valve entering the threaded opening and the other passageway for controlling the movement of the piston valve toward closed position, a cap screw threaded into the threaded opening, and a coiled spring interposed between the piston valve and the casing cap for normally holding the piston valve in closed position.

In testimony whereof I affix my signature.

SAMUEL Z. NICHOLS.