

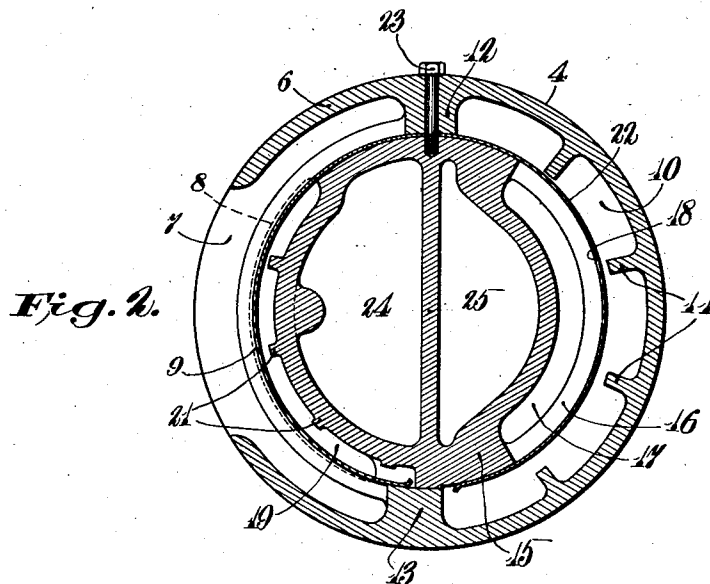
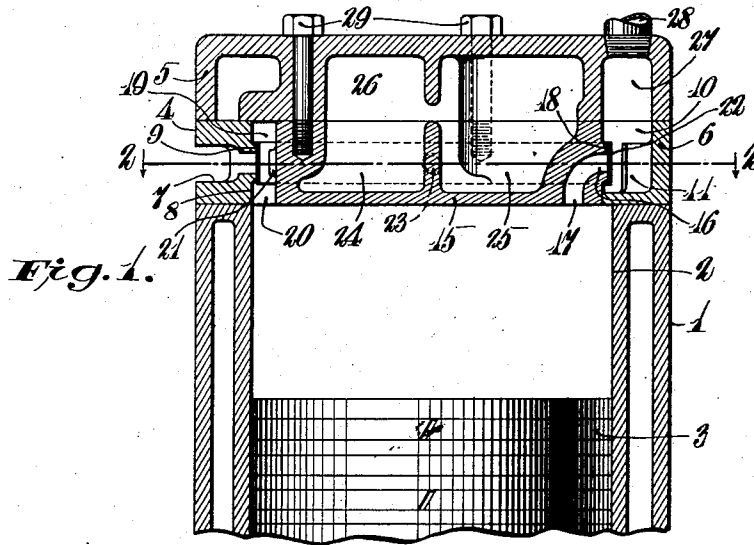
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L. J. CLAPP

VALVE MECHANISM

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UNITED STATES PATENT OFFICE.

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VALVE MECHANISM.

Application filed March 18, 1921, Serial No. 453,513. Renewed September 28, 1926.

My invention relates to valve mechanism and more particularly to valve mechanisms adapted to use in pumps or air compressors.

An object of my invention is to provide an improved pump valve mechanism. Another object of my invention is to provide an improved and simplified pump valve mechanism in which a single valve member may cooperate with a plurality of ports by means of different portions thereof. Other objects of my invention will appear in the course of the following specification and appended claims.

In the accompanying drawings, I have shown for purposes of illustration, one form which my invention may assume in practice.

In these drawings,—

Fig. 1 is a central vertical section through one end of the cylinder of a pump comprising the illustrative form of my improved valve mechanism.

Fig. 2 is a transverse section on the line 2—2 of Fig. 1.

For purposes of illustration I have disclosed my improved valve mechanism in use in a pump of the compressor type, which comprises a cylinder 1 having a bore 2 in which a piston 3 is reciprocable in any usual manner. The cylinder is closed at its rear end by a plurality of cooperating heads comprising an intermediate head 4 and an outer head 5. My improved valve mechanism now to be described is located within the intermediate head.

According to this illustrative construction, the intermediate head 4 is cut away at its central portion in such manner as to leave a generally annular rim portion or housing member 6. This rim portion is traversed at one side by a port slot 7 which communicates with the inner side 8 of the housing member and is surrounded on said inner side by a raised valve seating surface 9 which is of uniform curvature in the present instance. The opposite side of the housing member 6 is provided with an opening through one edge thereof, herein the upper edge as indicated at 10, and is also cut away at its inner side at a place approximately opposite the port 7 to varying degrees and provided with a plurality of stop members 11 each of different length. At diametrically opposite points the member 6 is provided with a plurality of inwardly projecting shoulders 12 and 13. Within the interior

of the generally annular housing member 6 is disposed a second member 15 which is semi-cylindrical in periphery on one side and on the other side deviates from this form by reason of the fact that it is cut away progressively to provide a port opening. On the semi-circular side, the member 15 is traversed at its periphery by a port 16 which is arcuate in form and which extends also through the lower lateral surface of the member 15 as indicated at 17 (Fig. 1). A valve seat surface 18 of uniform curvature is provided surrounding the port 16. The cut away portion of the member 15, herein designated 19, communicates by means of a port 20 with the interior of the cylinder and is provided with a series of stop members 21 of decreasing length as their distance from the shoulder 12 increases. In assembling my improved valve mechanism, the member 15 is inserted within the member 6 and is secured in suitable relation thereto with the port 16 opposite the cut away portion 10 of the member 6 and with the cut away portion 19 opposite the valve seat 9. A valve member of substantially circular cross section, but not making quite a complete circle, is shown at 22 and is clamped between the shoulder 12 and the member 15 by means of a bolt 23. The member 15 is chambered on its interior as indicated at 24 and 25 and communicates with a chamber 26 in the outer head member 5, whereby a cooling medium may be supplied to the interior of the head if desired. A chamber 27 connects with the space 10 and a discharge line 28 leads therefrom. The members 5 and 15 are held in assembled relation by bolts 29, and the members 4 and 5 are secured to the cylinder by any suitable means not shown.

From the foregoing description, the mode of operation of my improved valve mechanism will, it is thought, be readily apparent. The substantially annular valve is adapted to seat with its outer periphery against the valve seat 9 while its inner periphery at the opposite side seats against the valve seat 18. Upon downward motion of the piston 3, air or other fluid flows in through the port 7 which serves as an inlet port, for by reason of reduced pressure in the upper end of the cylinder, the left hand portion of the valve 22 is unseated and a charge of air or other fluid is drawn in. Upon reverse movement of the piston, the valve 22 closes upon its

seat 9 and the pressure developed upon upward motion of the piston causes the valve 22 at its opposite side to raise from the seat 18 and to uncover the port 16 whereby fluid is discharged to the chamber 27 and the discharge line 28. From the foregoing description, it will be evident that I have provided a single valve adapted to close with its opposite sides a plurality of ports and to successively permit the flow of fluid through them, these ports being of sufficient area to provide ample flow area for the fluid to be drawn in and discharged from the cylinder 2 at each reciprocation of the piston.

While I have in this application specifically described one form which my invention may assume in practice, it will be understood that this form is shown for purposes of illustration and that my invention may be modified and embodied in various other forms without departing from its spirit or the scope of the appended claims.

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

1. In a compressor valve mechanism, coaxial valve seating surfaces, inlet and discharge ports traversing said surfaces, and a single radially flexible valve cooperating with said ports.

2. In a pump valve mechanism, coaxial valve seating surfaces, ports traversing said surfaces and respectively communicating with a pump cylinder and with an exterior space, and a single radially flexible valve cooperating with said ports.

3. In a compressor valve mechanism, coaxial longitudinally extending valve seating surfaces, inlet and discharge ports traversing said surfaces, and a single valve cooperating at spacially separated portions thereof with said ports.

4. In a compressor valve mechanism, coaxial valve seating surfaces, inlet and discharge ports traversing said surfaces, and a single valve cooperating at spacially separated portions thereof with said ports, said valve having a portion movable away from the longitudinal axis of said mechanism.

5. In a compressor valve mechanism, coaxial valve seating surfaces, ports traversing said surfaces, and a single valve cooperating at the opposite sides thereof with said ports and having a free end movable in a radial direction.

6. In a pump valve mechanism, concentric valve seating surfaces formed on different radii, ports traversing said surfaces, and a single valve cooperating with said ports.

7. In a pump valve mechanism, concentric valve seating surfaces formed on different radii, ports traversing said surfaces, and a single valve cooperating with the opposite sides thereof with said ports.

8. In a pump valve mechanism, concentric valve seating surfaces formed on different

radii, ports traversing said surfaces, and a single valve cooperating with opposite ends thereof with said ports.

9. In a compressor valve mechanism, coaxial valve seating surfaces, inlet and discharge ports traversing said surfaces in a common plane which is wholly disposed at a right angle to the longitudinal axis of said mechanism, and a single valve cooperating with said ports.

10. In a compressor valve mechanism, coaxial valve seating surfaces, radially extending inlet and discharge ports traversing said surfaces, and a single valve cooperating with said ports and having a portion thereof between said ports held against movement.

11. In a compressor valve mechanism, a plurality of semi-cylindrical valve seating surfaces formed on different radii, fluid chambers disposed on opposite sides of said surfaces, ports traversing said surfaces, and a valve seating on said surfaces and normally interrupting communication between the opposite sides of said surfaces.

12. In a pump valve mechanism, a plurality of curved valve seating surfaces formed on different radii, a single valve cooperating with said surfaces, and ports formed in said surfaces and closed by opposite sides of said valve.

13. In a pump valve mechanism, a housing having a chamber formed therein, a portion of whose inner periphery is semi-cylindrical and also provided with a portion cut back opposite said semi-cylindrical portion, a member disposed within said chamber and having a portion of its periphery semi-cylindrical, a portion opposite said semi-cylindrical portion cut back from a cylindrical surface, the semi-cylindrical portions of said member and said housing being disposed opposite the cut back portions of the housing and member, ports traversing the semi-cylindrical portions of the peripheries of the member and housing, a single valve member cooperating with said ports, flow passages communicating with said ports, and flow passages communicating with the cut back portions of said member and housing.

14. In a pump valve mechanism, a housing having a chamber formed therein a portion of whose periphery is semi-cylindrical and also provided with a portion cut back opposite said semi-cylindrical portion, a member disposed within said chamber and having a portion of its periphery semi-cylindrical, and a portion opposite said semi-cylindrical portion cut back from a cylindrical surface, the semi-cylindrical portions of said member and said housing being disposed opposite the cut back portions of said housing and said member, ports traversing the semi-cylindrical portions of the peripheries of the member and housing, a single valve member cooperating with said ports, flow

passages communicating with said ports, and flow passages communicating with the cut back portions of said member and housing, said valve being held immovable at a point intermediate its ends between said member and said housing.

15. In a pump valve mechanism, a valve cage member traversed by inlet and discharge ports, valve seat surfaces surrounding said ports, said ports being arranged at opposite sides of a plane cutting said valve cage and extending longitudinally thereof, and flexible valve means controlling said ports and moving towards said plane to open one of said ports and moving therefrom to open the other.

16. In a compressor valve mechanism, coaxial valve seating surfaces extending in a direction disposed at an angle to a transverse plane, ports traversing said surfaces, and a single valve having flexible end portions movable in opposite directions cooperating with said ports.

17. In a compressor valve mechanism, curved valve seating surfaces lying in a vertical position, ports traversing said surfaces, and a single generally annular valve cooperating therewith having portions oppositely movable in a horizontal plane but

movable generally in the same direction with respect to the longitudinal axis of said mechanism to open said ports.

18. In a compressor valve mechanism, coaxial valve seating surfaces, ports traversing said surfaces, and a single generally annular valve cooperating with said surfaces having a rigid central portion and radially movable flexible end portions.

19. In a compressor valve mechanism, coaxial valve seating surfaces, inlet and discharge ports transversing said surfaces, and a single valve having radially flexible end portions movable in opposite directions cooperating with said ports.

20. In a compressor valve mechanism, coaxial valve seating surfaces, inlet and discharge ports transversing said surfaces, and a single valve having a rigidly secured central portion and flexible end portions radially movable in opposite directions cooperating with said ports.

21. In a compressor valve mechanism, arcuate valve seating surfaces formed on different radii, inlet and discharge ports transversing said surfaces, and a single valve cooperating with said ports.

In testimony whereof I affix my signature.

LEWIS J. CLAPP.