J. KEPPEL.

AIR PUMP AND VALVE THEREFOR.

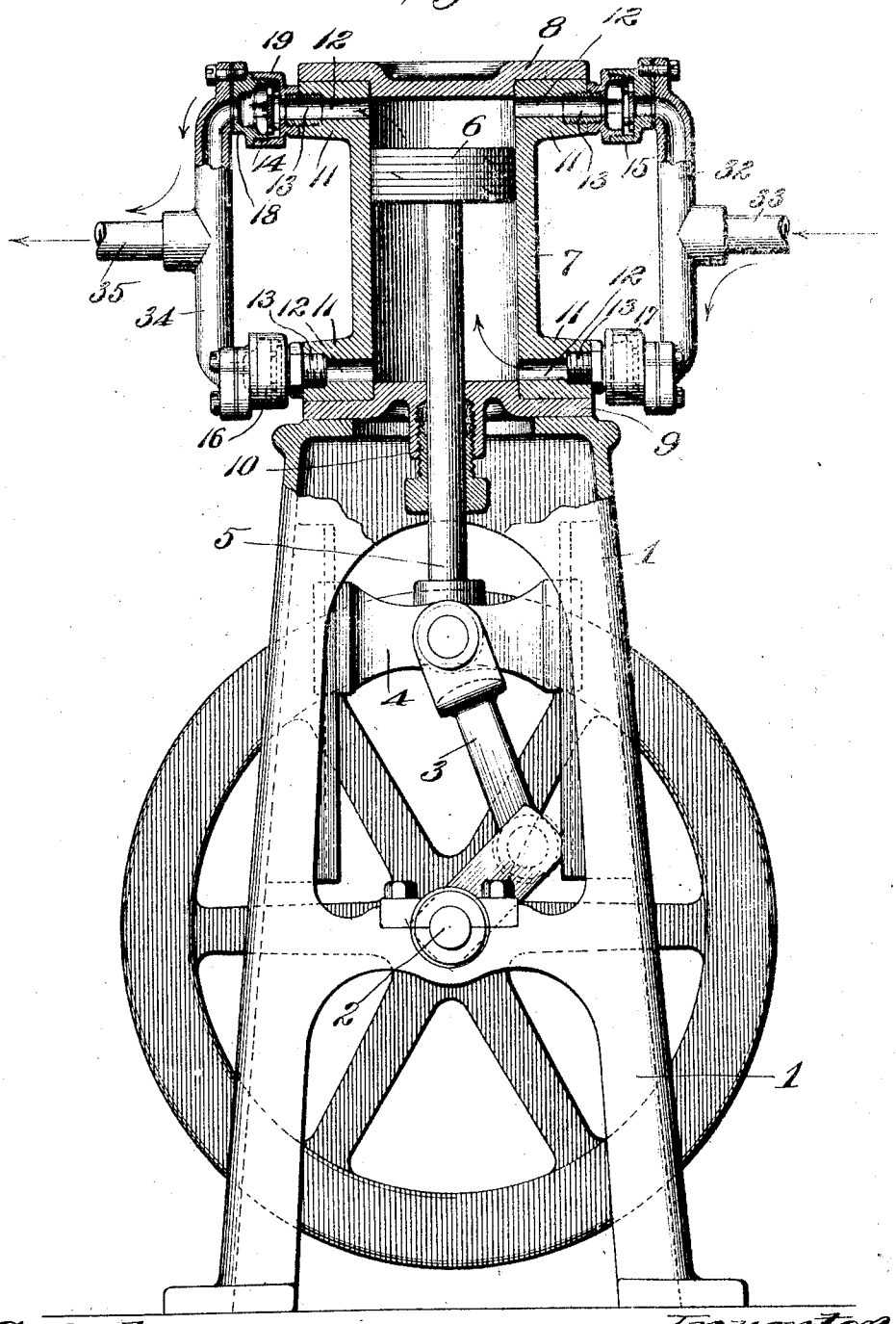
APPLICATION FILED JULY 21, 1913.

1,111,906.

Patented Sept. 29, 1914.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses:

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Stella Hill

Inventor:

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2 SHEETS—SHEET 2.

Fig. 3.

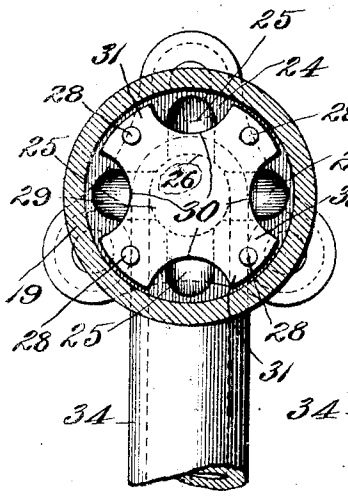


Fig. 2.

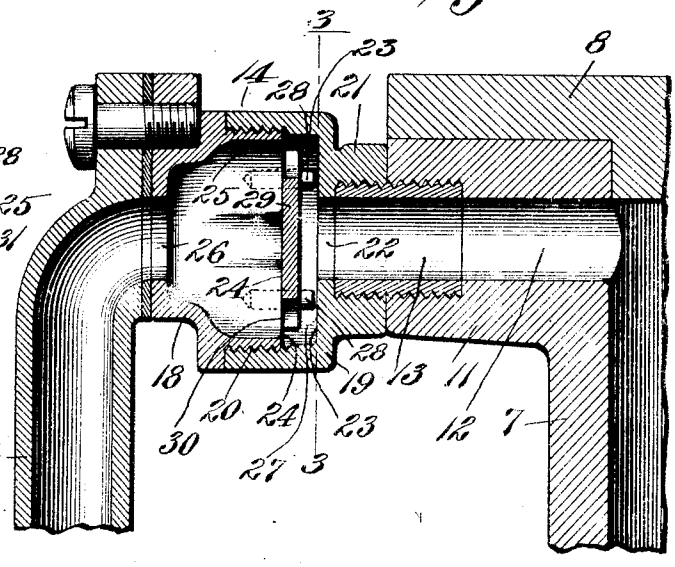


Fig. 5.

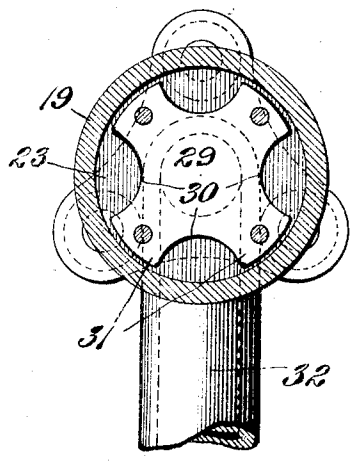
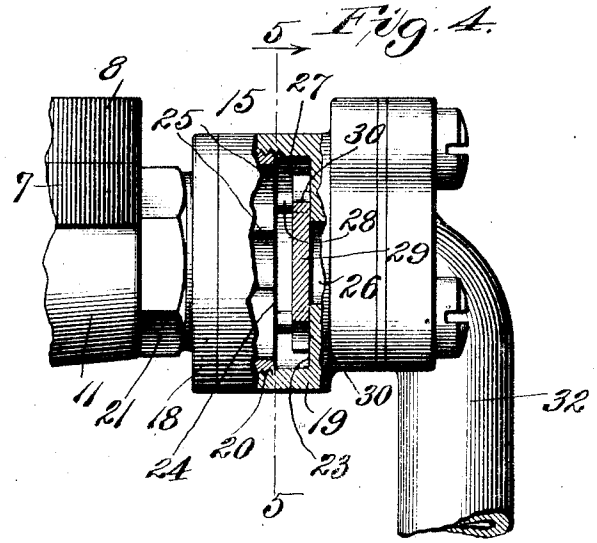


Fig. 4.



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UNITED STATES PATENT OFFICE.

JESSE KEPPEL, OF ST. LOUIS, MISSOURI.

AIR-PUMP AND VALVE THEREFOR.

1,111,906. Specification of Letters Patent. Patented Sept. 29, 1914

Application filed July 21, 1913. Serial No. 780,186.

To all whom it may concern:

Be it known that I, JESSE KEPPEL, a citizen of the United States, residing in the city of St. Louis and State of Missouri, have invented new and useful Improvements in Air-Pumps and Valves Therefor, of which the following is a specification.

This invention relates to valve mechanism, and has for its object to provide a novel construction of valve for use particularly in air pumps, although not limited to such application.

In the construction of the valve I aim to overcome the objections incident to the use of such valves as have come more or less into commercial use in connection with air pumps, and air compressors, the principal objection to such valves being that after a little while they fail to seat accurately and permit the leakage of air, and, after use for a relatively short time, the pounding of the valve against its seats causes it to wear away so rapidly that it soon becomes inoperative, and a new valve must be substituted. Further, such wearing away of the valves causes them to impair the seats so that the latter have to be frequently reground.

According to my invention I employ a relatively thick valve of the disk type which is guided to move accurately through a defined plane, so that it will always strike the seat flatwise and thus avoid denting it, while at the same time minimizing the wear. The valve has only a slight range of movement; but the resistance to the escape of air which would follow from restricting the effective area of the valve chamber, is compensated for by so shaping the valve and its seat on the outlet side as to permit the ready flow of air past the valve.

In the accompanying drawings—Figure 1 is a view partly in elevation and partly in vertical section illustrating a pump having my improved valve mechanism applied thereto; Fig. 2 is a vertical sectional view on an enlarged scale illustrating a portion of the pump cylinder with a valve and its connecting parts attached thereto, the valve being shown in the open position; Fig. 3 is a sectional view on the line 3—3 of Fig. 2; Fig. 4 is a view in broken sectional elevation of the valve on the opposite side of the cylinder to that of Fig. 2, the valve being shown in the closed position; and Fig. 5 is a sectional view on the line 5—5 of Fig. 4.

Referring now to the drawings, the numeral 1 indicates an upright frame in which is mounted a driven crank shaft 2 which, through the medium of a link 3, reciprocates a cross head 4 to which is connected a reciprocating piston rod 5, having a piston 6.

The numeral 7 indicates the pump cylinder having a head 8 and a bottom 9, the latter being provided with a stuffing box 10 through which the piston rod 5 works. The piston is provided at opposite ends with bosses 11 which are apertured to provide ports 12. Each of these ports is interiorly screw threaded in its outer portion to receive one end portion of a screw threaded coupling member 13. The valves employed are all of the same construction, and are indicated generally by the numerals 14, 15, 16, and 17. Each valve comprises a casing made in two parts 18 and 19, having screw threaded connection as indicated at 20, and the part 19 having a throat 21 which is interiorly screw threaded to receive the screw threaded projecting portion of the coupling member 13 by means of which it is attached to the pump, and being provided with an aperture 22 corresponding in diameter with the bore of the coupling member 13 and of the port 12. Surrounding the aperture 22 is a flat annular seat 23. The member 18 is provided on its face confronting the valve seat 23 with an annular seat 24, which is provided with, preferably, four equally spaced grooves 25 which extend from near the periphery of the seat to the circumference of an aperture 26 formed in the rear wall of the casing member 18. The space between the valve seats 23 and 24 affords an annular chamber 27 constituting the valve chamber proper; and projecting into this chamber from the face of the valve seat 24 are, preferably, four pins 28, each of which is located intermediate two grooves 25. The pins 28 extend nearly to the valve seat 23 and form guides for a disk-valve 29. The valve 29 is formed from a circular plate of metal and has its body portion cut away at four equi-distant points around its circumference to provide semi-circular recesses 30 and intermediate tongues 31, the recesses 30 coinciding in position with the grooves 25, and the tongues 31 being apertured to receive the pins 28. The valve 29 is of relatively thick metal; that is to say, its thickness relative to the depth of the valve chamber 27 is such that the distance it moves between the seats 23 and 24 is preferably no

greater than the thickness of the valve itself. This insures not only quick action of the valve, but its range of movement is so small as to largely obviate pounding of the valve, thus prolonging its life. Furthermore, the pins 28 prevent all canting of the valve and insure that it will seat flatwise, thus, not only, as stated, preventing denting of the seat 23, but preventing also rotational or lateral movement of the valve, with consequent wear of the seat. Further, by this construction, as every part of the valve always strikes the corresponding part of the seat 23, any wear between them is mutual and corresponding, as to area and conformation, and therefore has no tendency to cause an uneven seating of the valve which would permit leakage of air. While the like advantages apply to the action of the valve on the seat 24, they are not so important in this instance except as thy tend to prevent wear of the valve. The corresponding valves 15 and 17 are connected by a pipe 32 centrally of which is connected an intake pipe 33, and the valves 14 and 16 are connected by a similar pipe 34, centrally of which is connected an outlet pipe 35 which will lead to the container in which the air is to be stored under pressure.

The action of the pump as a whole is similar to that of an ordinary double acting pump, and need not be described in detail. Suffice it to say that the valves are automatic in action, and that as the piston ascends the valves 14 and 17 will be opened and the valves 15 and 16 closed, and when the piston descends the valves 14 and 17 will be closed, and the valves 15 and 16 opened. Thus, in each movement of the piston air will be drawn into the cylinder through the intake 33 and be discharged through one or the other of the valves 14, 16, through the outlet pipe 35.

I claim:

1. A valve for air pumps comprising a casing affording a valve chamber, a disk-valve mounted in said chamber, one side of said chamber providing a flat seat for the valve to prevent the escape of air, and the other side being provided on its face with grooves, said valve being provided with peripheral recesses corresponding in position with said grooves.

2. A valve for air pumps comprising a casing affording a valve chamber, a series of pins projecting into said chamber, a disk-valve located in said chamber and mounted to move on said pins and provided with peripheral recesses, one wall of said chamber providing a flat seat for the valve, and the other wall being provided with grooves corresponding in position with the recesses of the valve to permit the passage of air around the valve.

3. A valve for air pumps comprising a casing affording a valve chamber, a disk-valve mounted in said chamber, one side of said chamber providing a flat seat for the valve to prevent the escape of air, and the other side being provided on its face with grooves, said valve being provided with passages corresponding in position with said grooves.

In testimony whereof, I have hereunto set my hand in presence of two subscribing witnesses.

JESSE KEPPEL.

Witnesses:
BRUCE S. ELLIOTT,
THOS. H. KEPPEL.