

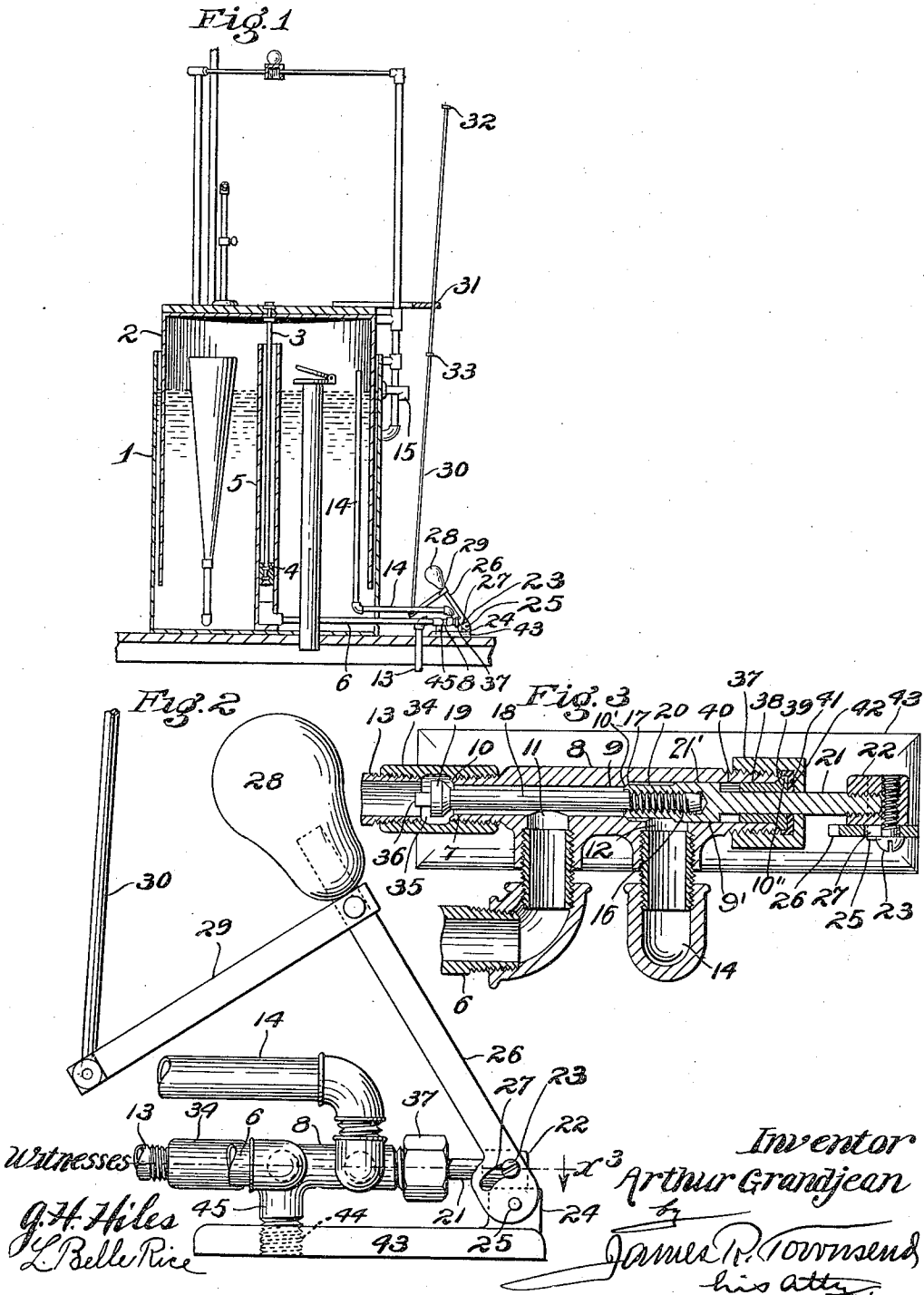
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VALVE FOR AUTOMATIC HYDRAULIC AIR COMPRESSOR OPERATING SYSTEMS.

APPLICATION FILED DEC. 20, 1910.

1,065,042.

Patented June 17, 1913.



UNITED STATES PATENT OFFICE.

ARTHUR GRANDJEAN, OF SAN DIEGO, CALIFORNIA.

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Specification of Letters Patent. Patented June 17, 1913.

Application filed December 20, 1910. Serial No. 598,436.

To all whom it may concern:

Be it known that I, ARTHUR GRANDJEAN, a citizen of the United States, residing at San Diego, in the county of San Diego and State of California, have invented new and useful Improvements in Valves for Automatic Hydraulic Air-Compressor-Operating Systems, of which the following is a specification.

10 The invention relates to a valve to be used in connection with an air compressor for a carbureting apparatus, such as is illustrated in Letters Patent of the United States No. 953606, granted to me March 29, 1910.

15 The object of this invention is to provide improved anti-friction means for operating the bell of the air compressor pump, shown in said patent, and for maintaining the seal thereof.

20 The invention relates more particularly to the means whereby the motive liquid from the pressure source is introduced into and discharged from the motor cylinder.

25 Further objects are cheapness and compactness of the motive fluid controlling device and ease of assembling the same.

In practice it is found that the valve for controlling the liquid which operates the piston and thereby operates the bell of the air compressor must be very sensitive in order that the water will be directed into the cylinder and discharged therefrom in a thoroughly practical manner, for the reason that if the valve sticks and remains partially open or closed, the gas making operation ceases. By this invention I provide for said system a valve which is readily assembled and in which the friction is minimized and provision against leakage is maintained and the valve is guided in perfect alinement.

30 35 40 The accompanying drawings illustrate the invention.

45 Figure 1 is a vertical section of an automatic air compressor to which is applied a valve constructed in accordance with this invention. Fig. 2 is an enlarged elevation of the valve device. Fig. 3 is a horizontal section of the valve device.

50 The tank 1 and the bell 2 are arranged as the tank and bell of an ordinary gasometer and the bell is moved vertically by the rod 3 of a piston 4 which is in the vertical motor cylinder 5 that extends above the water level in the tank and is open inside the bell at its upper end and is connected at its lower end with the power pipe 6 through

which the fluid to operate the piston is admitted and exhausted.

7 indicates the screw-threaded inlet end of the valve barrel 8 which is provided with two co-axial straight cylindrical bores 9, 9' of two diameters and is provided with valve seats 10 and 10' at the opposite ends of the smaller bore 9 and a bushing seat 10'' at the outer end of the larger bore 9', said barrel being also provided with lateral ports 11, 12, for the bores 9 and 9' respectively, the port 11 being between the valve seats 10, 10' and port 12 being between the valve seat 10' and bushing seat 10''.

65 70 The supply pipe 13 is screwed onto the inlet end 7 of the valve barrel and leads from the fluid pressure source, not shown. The power port 11 is connected with the power pipe 6 and the exhaust port 12 is connected with the exhaust pipe 14 which in the form shown extends up into the bell and terminates above the level of the overflow 15 of the tank.

80 The screw-threaded tip 16 of the valve stem 18 screws into the socketed tip 17 of the valve plug 20 which has a larger portion 21 that fits the interior of the larger bore 9' of the barrel. The supply valve plug 19 closes the valve seat 10 and the valve plug 17 closes the valve seat 10' at the reverse positions of the valve stem.

85 90 Between the inlet 7 and the exhaust pipe 14, the valve barrel is provided with the supply and exhaust valve seats 10 and 17.

A valve stem 18 extends between the valve seats and is provided at opposite ends with the supply and exhaust valve plugs 19 and 20.

95 The space between the valve plugs exceeds the space between the valve seats so that the plugs may be alternately seated in and withdrawn from their seats by reciprocating the valve stem.

100 The exhaust valve plug 20 is internally screw-threaded, and the valve stem 18 is screwed thereto. Said exhaust plug 20 is connected by a valve rod 21 with a slide 22 into which it is screwed, and which is provided with a pin 23 and works on a guide-way 24, to which is pivoted, by a fulcrum 25, the weighted operating lever 26, having near the fulcrum 25 a segmental slot 27 into which the pin 23 extends.

105 110 The lever 26 is capable of moving from side to side of a vertical line drawn upward from its fulcrum 25 and is provided at its

upper end with a weight 28 and with a lateral arm 29. The arm 29 has loose connection through the bell rod 30 with the bell 2, said rod being pivoted to the arm and working through an eye 31 carried by the bell; the arm being provided with buttons 32, 33, with which the eye contacts at the upper and lower limits of the travel of the bell, thus to move the lever in one and the other direction to overbalance it past said vertical, and thus to reciprocate the valves.

The valve barrel is connected with the supply pipe 13 by a coupling 34 provided internally with a valve chamber 35 in which the supply valve plug 19 works. Said supply valve plug may be integral with the valve stem 18, and a seat 36 may be provided at the outer side of the valve plug for an instrument, as a wrench or screwdriver, by which the valve stem may be turned to screw it into the exhaust valve plug 20.

The ends of the valve barrel are screw-threaded; the supply or inlet end being adapted to receive the coupling forming the inlet valve chamber 35; and the exhaust end being adapted to receive the gland 37 of a stuffing box. A bushing 38 provided with a head 39 is neatly fitted inside the exhaust valve chamber 40, the same being preferably taper.

Between the exhaust valve plug 20 and the valve rod 21 there is formed a guide plug 21' which neatly fits the exhaust valve chamber 40 and is of the same diameter as the bushing 38.

A packing chamber 41 outside the bushing is provided with packing 42, thus preventing leakage around the valve rod 21. Said valve rod is screw-threaded into the slide 22, and the underside of said slide fits upon the guide-way 24 so as to take up all shock of the weighted lever 26 as it falls from side to side.

By the construction shown the packing 42 may be very thin and the friction caused by its compression against the valve 21 is minimized and the bushing 38 forms an anti-friction guide for the valve rod 21, and the guide plug 21' in the exhaust valve chamber 20 forms an additional guide, so that the valve plugs 17 and 19 carried thereby are rigidly held in alinement and play freely in the longitudinal bore.

The bushing head seats in the valve seat 10' and is tightly held therein by the cap 37 screwed home upon the threaded end of the valve barrel.

The valve barrel 8 and guide-way 24 are mounted upon a common base 43; the guide-way in the instance shown, being integral with said base and raised thereabove, and said base being provided with a threaded seat 44 into which a threaded post 45 ex-

tending downward from the valve barrel is screwed.

The lever pin 23 is screwed into the slide 22, and by unscrewing the same and turning the valve barrel on its post 45 to remove the slide 22 from the guide-way, and then unscrewing the gland 37 from one end of the valve barrel and the inlet chamber or coupling 10 from the other end and then unscrewing the valve stem 18 from the exhaust valve plug 19, the two valve plugs may be removed from the valve barrel. Re-assembling is accomplished by a reverse operation.

The length of stroke of the duplex valve shown in the drawings may be adjusted as desired by screwing the valve stem into or out of the exhaust valve plug.

In practical operation, when the supply valve is fully open, the exhaust valve is closed and the liquid will flow from the supply pipe 13 through the power pipe to the cylinder, thus operating the piston to raise the bell. When the bell has risen to the required height it trips the weighted lever in the usual manner, thus closing the supply valve and opening the exhaust valve, thus allowing the liquid to flow from the motor cylinder 5 through the exhaust port as the bell descends in the operation of pumping air.

The exhaust pipe 14 is led up through the tank to a point above the level of the overflow 15 from said tank, thus maintaining the supply of liquid in the tank.

The fluid employed is preferably water taken from a main or pressure tank, the same being under sufficient pressure to lift the bell. The higher the pressure the smaller diameter of piston may be used.

I claim:—

A valve device comprising a barrel having two bores of different diameters, inlet and exhaust valve seats at the ends respectively of the smaller bore, inlet and exhaust valve plugs to alternately seat in said valve seats, a valve stem detachably connecting the valve plugs and having a smaller diameter than the valve bores, a bushing fitting in and seated against the end of the barrel, removable means to hold the bushing in place, a power port adjacent the smaller valve bore, an exhaust port adjacent the larger valve bore, and a valve rod connected to the exhaust valve plug and guided by the bushing.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 10th day of December, 1910.

ARTHUR GRANDJEAN.

In presence of—

JAMES R. TOWNSEND,

L. BELLE RICE.