

UNITED STATES PATENT OFFICE.

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HIGH-PRESSURE VALVE.

1,160,070.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, THADDEUS S. GRIMES, a citizen of the United States, residing at Columbus, in the county of Muscogee and State of Georgia, have invented certain new and useful Improvements in High-Pressure Valves; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to hydraulic valves, and especially to the general class of valves disclosed in Figures 2, 3 and 4 of Patent #1120474, issued December 8, 1914.

An object of the invention is to provide a valve to close against fluid pressure wherein that fluid pressure serves to hold the valve closed against its own pressure.

A further object of the invention is to provide a valve having a predetermined area exposed to the fluid pressure tending to open the valve, with a greater area exposed to the same fluid pressure tending to close the valve.

A further object of the invention is to produce a valve having a separate part operating as a piston, such separate part being mechanically raised and lowered and held in raised position by such mechanical means, with means for conducting the fluid pressure through an orifice against the piston, and acting therein against such piston to hold the valve seated against its own fluid pressure; and to increase the seating pressure in the same ratio as the opening pressure is increased.

With these and other objects in view, the invention consists in certain novel constructions, combinations, and arrangement of parts as will be hereinafter more fully described and claimed.

In the drawings: Fig. 1 is a view of the valve in side elevation, the valve housing being shown in section. Fig. 2 is a view of the valve shown in section, the valve housing being taken at right angles to the section of valve housing shown at Fig. 1.

Like reference characters designate corresponding parts throughout the several views.

The improved valve mechanism which forms the subject-matter of this application comprises a valve proper adapted to be seated against the seat 11 to prevent

at times the passage of the fluid as indicated by the long arrows at Fig. 1. To close such valve, a pin 12 is mounted upon a mechanical operating means as the eccentric 13, so that by manipulating such eccentric, the valve 10 is raised and lowered by the raising and lowering of the pin. This pin is in the form of a piston with a piston head 14 mounted within a portion of the valve member serving as a cylinder with a packing ring 15 which, when expanded by internal fluid pressure, serves to form a fluid-tight joint between such packing ring and the cylinder. Above the piston head 14 the pin 12 is extended as shown at 12' to pass through the opening of the annular ring 15 and abut against the top wall of the chamber in the valve hereinafter referred to.

Through the valve member 10 an orifice 16 is provided forming communication between the chamber of the valve housing receiving the fluid pressure and a chamber 17 formed within the valve member. It is obvious that when fluid passes through the orifice 16 into the chamber 17 it will bear against the piston head 14 and serve to force the piston downwardly, or, if the downward movement of the piston is resisted, then to raise the valve member. It will also be noted that the area of the piston head 14 is greater than the exposed area of the valve 10 and that the fluid passing through the orifice 16 is the fluid which acts against the top of the valve so that the pressure of the fluid within the chamber 17 is at all times equal to the pressure of the chamber upon the top of the valve.

When operating under enormous fluid pressure, it has been found that the eccentric 13 will serve to raise the valve to seat, but that when the pressure builds up upon the top of the valve, some of the structure "gives" whereby leakage between the valve and its seat is produced. With the structure as shown in this drawing, when the fluid pressure above the valve builds up, it also builds up within the chamber 17 and any "giving" of the pin 12 or eccentric 13 is compensated for by the movement provided for between the valve member 10 and the piston head 14—the pressure of the fluid constantly acting to hold the valve to seat by acting against the piston head which is more particularly at Fig. 2. When it is free to "give" a limited distance as shown

desired to open the valve, the mechanical means as the eccentric 13 is manipulated to drop the pin 12 until the piston head 14 comes in contact with the screw ring or nut 18, when the valve and the pin becomes a rigid structure, and any further operation of the eccentric permits the entire structure to drop, thereby opening the valve in the usual manner. When the valve is to be closed, the pin 12 is raised bringing the extended portion 12' into engagement with the upper wall of the chamber 17, and the continued raising of the pin 12 by the eccentric forces the valve 10 upwardly to seat. This mechanical closing of the valve is sufficient when the valve is first closed and before the fluid pressure above the valve has built up to such an extent as to cause such a yielding of the support and housing as will force the valve open if retained in such closed position only by such mechanical means. As has been previously pointed out, however, when the pressure above the valve builds up, it also builds up in the chamber 17 and the effective area within such chamber being greater than the effective area at the top of the valve, such fluid pressure maintains the valve in closed position against its own pressure.

I claim:

1. In a valve, a valve member, a valve seat, a member movable within a chamber formed in the interior of the valve member, said valve member having an orifice communicating between such chamber and the pressure-receiving side of the valve, and means to raise the valve to seat by such movable member.

2. In a valve, a housing embodying a valve seat, a valve member proportioned to cooperate with and close against the seat and exposing a predetermined area to fluid

pressure, a piston slidable in a chamber formed within the valve, means acting against the piston to raise the valve to seat, said valve being provided with an orifice forming communication between the pressure-receiving area of the valve and the chamber.

3. In a valve, a valve housing embodying a valve seat, a valve proportioned to coact with and be seated against the seat, a piston slidable within the valve member and having an area greater than the portion of the valve exposed to fluid pressure, said valve being provided with a passage forming communication from the pressure-receiving area to the piston, and mechanical means adapted to act upon the piston to raise and maintain the valve in raised position.

4. In a valve, a valve housing embodying a valve seat, a reciprocating valve proportioned to be seated against the seat, and providing a predetermined area exposed through the seat to the fluid pressure, a piston slidable within a chamber formed in the interior of the valve member and exposing a greater area than the exposed area of the valve, said valve being provided with a passage forming communication between the exposed area of the valve and the chamber, a valve stem carried by the valve and extending outwardly therefrom, and mechanical means acting against the valve stem adapted to raise the piston and the valve to seating position.

In testimony whereof I affix my signature in presence of two witnesses.

THADDEUS S. GRIMES.

Witnesses:

THOMAS O. OTT,
E. J. WILLIAMS.