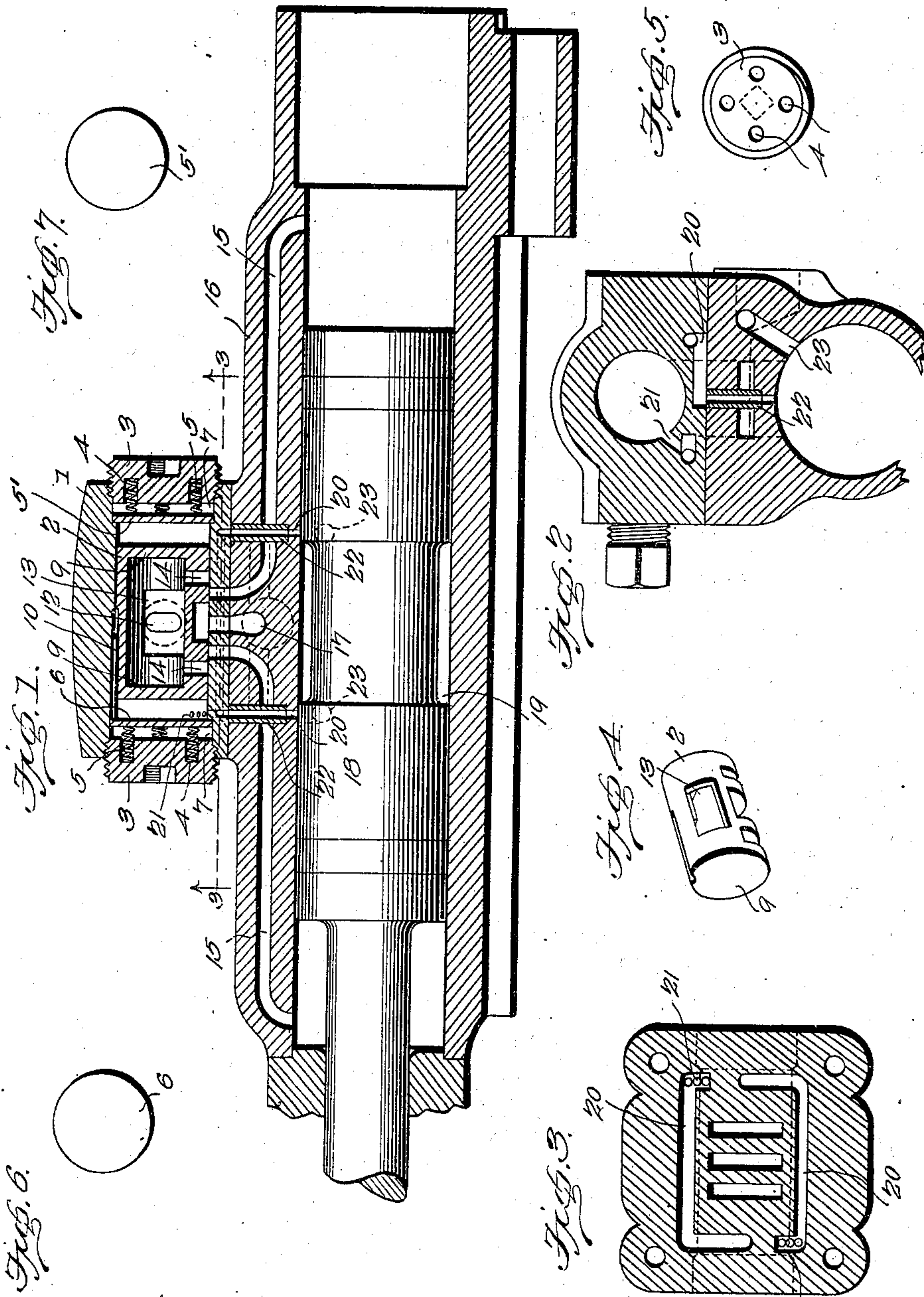


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H. S. BURRELL.  
VALVE FOR ROCK DRILLS.  
APPLICATION FILED JULY 25, 1900.

NO MODEL.



Witnesses  
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# UNITED STATES PATENT OFFICE.

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## VALVE FOR ROCK-DRILLS.

SPECIFICATION forming part of Letters Patent No. 726,632, dated April 28, 1903.

Application filed July 25, 1900. Serial No. 24,852. (No model.)

*To all whom it may concern:*

Be it known that I, HARRY S. BURRELL, a citizen of the Dominion of Canada, residing at Belleville, in the Province of Ontario and Dominion of Canada, have invented a new and useful Balance-Valve for Rock-Drills, of which the following is a specification.

This invention relates to balance-valves for rock-drills, and has for its principal object to provide a construction of valve in which all stems or other guides extending to the exterior of the valve-chest are dispensed with.

A further object is to improve the construction and lessen the cost of apparatus of the class and to provide a perfectly-balanced valve in which the steam or air pressure will be exerted with equal force and over an equal area of surface at the top and bottom of the same.

A still further object of the invention is to provide at each end of the valve-casing buffers which will yield gradually to the movement of the valve and prevent contact of the same with the fixed end of the valve-chest.

With these and other objects in view the invention consists in the novel construction and arrangement of parts hereinafter described, shown in the accompanying drawings, and particularly pointed out in the appended claims.

In the accompanying drawings, Figure 1 is a longitudinal sectional elevation of the cylinder and piston of a rock-drill and a valve in connection therewith embodying the features of the invention. Fig. 2 is a transverse sectional elevation of the same on the line 2 2 of Fig. 1. Fig. 3 is an inverted horizontal section on the line 3 3 of Fig. 1. Fig. 4 is a detail perspective view of the valve proper. Fig. 5 is a detail elevation of one of the heads of the valve-chests looking toward the inner face thereof. Figs. 6 and 7 are detail elevations of the two buffer-washers.

Similar numerals of reference designate corresponding parts throughout the various figures of the drawings.

The numeral 1 designates the chest or valve casing in which the valve 2 travels, the ends of the chest or casing being internally screw-threaded to removably receive the heads or covers 3, which are drilled from their inner faces to form seats 4 for washer-springs 5,

serving as buffers against buffer washers or disks 5' and 6, movably mounted in annular seats 7 in the interior of the opposite end portions of the chest or casing inside of the end screw-threads of the latter. The valve 2 is of cylindrical form and has opposite closed ends 9, and in order to hold the same from rotative movement a key 10 is employed. The key is let one half into the valve and the other half into the chest or casing and permits free longitudinal movement of the valve under the influence of air or steam pressure at the opposite ends of the valve-chest. The steam or air enters the chest or casing through a port 12 at one or at both sides thereof and enters the interior of the valve through diametrical elongated ports 13, and from said valve the steam or air passes through usual ports 14 and ducts 15 in the upper portions of the cylinder 16 in the ordinary manner. The valve can be perfectly balanced by proportioning the ports 13 by cutting out the top walls thereof, thus allowing the pressure to act on the back of the valve, the object being to have an equal upper and lower area of the valve exposed to pressure. In the upper portion of the cylinder is the usual exhaust-port 17 in communication with the lower central portion of the valve-chest and adapted to be placed in communication with either of the cylinder inlet-ports to exhaust the steam or air from either end of the main cylinder. Within the cylinder is a piston 18, having an intermediate annular recess 19, which may at times be placed in communication with the ends of the valve-chest and with the exhaust-port, the piston acting as a valve to alternately open and close the ports leading from opposite ends of said valve-chest.

In the lower portion of the valve chest or casing are two longitudinally-arranged ports 20, communicating through openings 21 with the interior of the valve-chest at opposite ends thereof, and the opposite ends of the ports 20 are extended at a right angle and terminate at the longitudinal center of the valve-chest, the terminal points being opened to the lower edge of the valve-casing, as shown more clearly in Fig. 2. The ports 20 are extended through the main cylinder of the casing and there communicate with the annular



space 19, the open ends of the port being alternately closed and opened by the main piston 18. It will be seen that the enlarged portion of one end of the piston will close the port leading from the opposite end of the valve-chest, this being for the purpose of securing a simultaneous movement of the valve and piston in the same direction. In order to pass the main steam ports or ducts 15, the vertical portions of the ports 20 have been arranged in the form of tubes 22, as illustrated. In horizontal alinement with the ports 20 are ports 23, communicating with the main exhaust 17, as shown by dotted lines in Figs. 1 and 2, the disposition of the ports being such that the ports 20 and 23 of each pair will be simultaneously opened and closed by the main piston, the movement of the piston and the uncovering of one set of ports placing one end of the steam-chest in direct communication with the main exhaust-port and closing the opposite pair of ports to prevent any escape of steam or air from the opposite end of the chest.

The motive medium, either compressed air or steam, enters the hollow valve, as hereinbefore explained, and the valve being loose the steam or air blows over each end of the valve between the latter and the adjacent washer or disk or the end of the valve-chamber, thus applying pressure at each end of the valve. By means of the ports 20 and 23, which are opened in alternation by the piston to the exhaust-port, the pressure is relieved by the travel of the piston at either end, and the valve will travel in a similar direction or toward the point of least resistance or the relieved end of the valve-chest, thereby causing the piston to move in the same direction until the other end of the valve-chest is relieved, and so on through the length of time the apparatus is in operation.

The spring-buffers at the ends of the valve-chest cushion the movement of the valve and prevent any direct impact of the valve against the fixed ends of the chest. By the form of valve set forth the incidental stems, binding attachments, and other devices usually employed are entirely dispensed with and a more efficient and positive operation results. In order to remove the heads of the chest, they are formed with central angular recesses for the application of any suitable tool.

While the preferred form of the improved device has been illustrated and described, it is obvious that changes in the form, size, proportions, and minor details may be resorted to without departing from the principle of the invention.

Having thus described my invention, what I claim is—

1. In a device of the class described, a cylinder, a reciprocating piston therein having

an intermediate recess, a valve-chest, ports leading therefrom to the cylinder and to a main exhaust, a loose valve arranged within said valve-chest, a steam-supply leading to the interior of the valve, ports extending from the opposite ends of the valve-chest to the main cylinder, and escape-ports alining therewith and extending from the main cylinder to the main exhaust-port.

2. In a device of the class described, the combination with a chest or casing and a cylinder having a piston therein, of a hollow valve having means for receiving air or steam thereinto, the air or steam blowing over between the ends of the valve and the ends of the valve-chest, ports or passages leading from the ends of the valve-chest to the cylinder, ports leading from the cylinder to the main exhaust-port, said ports being arranged in pairs and adapted to be alternately opened and closed by the piston.

3. The combination with a cylinder having a fluid-pressure-actuated piston therein, of a cylindrical steam-chest having a longitudinally-disposed key-seat extending to the end of the bore of the chest, a piston-valve arranged in said steam-chest and provided with ports for governing the flow of the steam or air, there being a longitudinally-disposed key-seat cut in the periphery of the piston-valve and extending to one end of said valve, and a longitudinally-disposed key arranged wholly within the chest and held in place by the two key-seats, the latter being so arranged as to permit of the removal of both the piston and the key from the end of the steam-chest, substantially as specified.

4. In a device of the class described, a cylinder, a reciprocating piston therein having an intermediate recess, a valve-chest, ports leading therefrom to the cylinder and to a main exhaust, a steam or air supply leading to the interior of the valve, ports leading from the opposite ends of the valve-chest in opposite direction and terminating at points within the cylinder for communication with the intermediate recess of the piston, ports leading from the cylinder to the main exhaust, the openings of said ports in the cylinder being in the same plane with the openings of the respective ports leading from the valve-chest, and said ports being arranged in pairs and adapted to be opened and closed alternately by the piston to afford direct communication between one or other end of the valve-chest and the main exhaust.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

HARRY S. BURRELL.

Witnesses:

FRANCIS S. WALLBRIDGE,  
GRACE CUNNINGHAM.