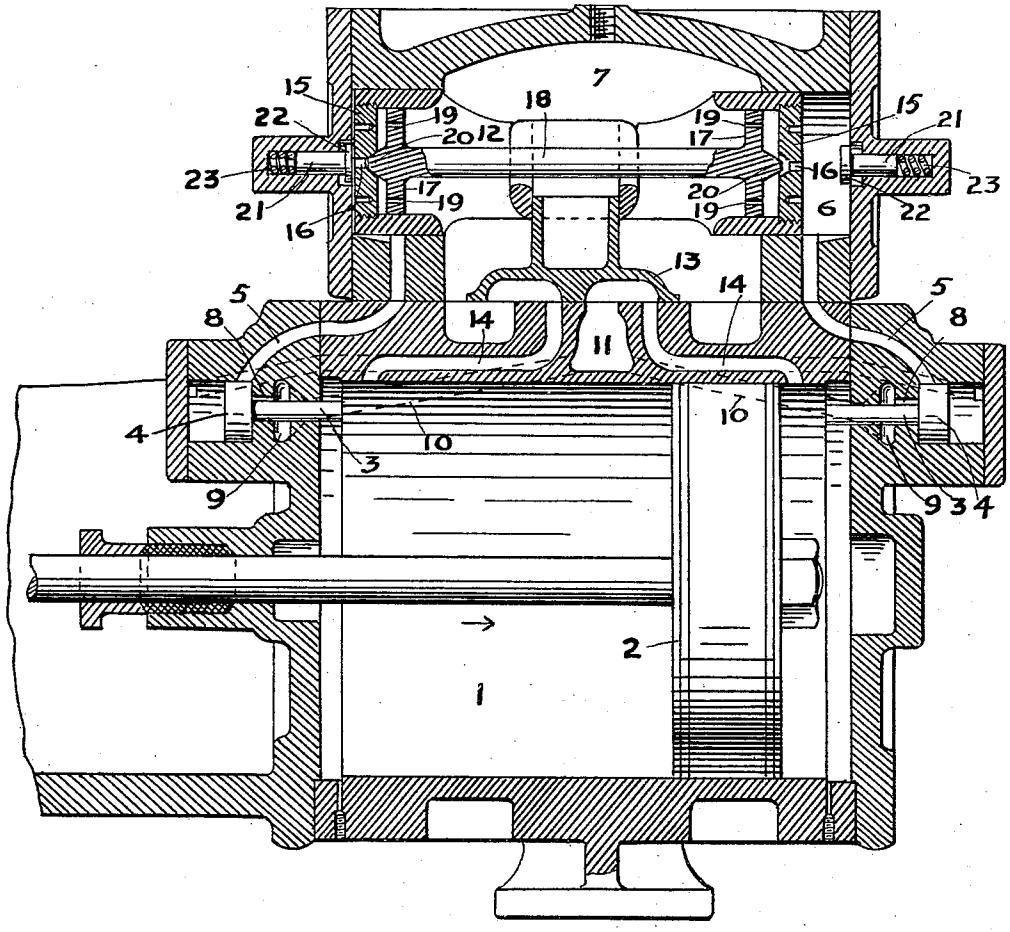
No. 870,391. PATENTED NOV. 5, 1907.

D. W. STARRETT.

STEAM ACTUATED VALVE.

APPLICATION FILED MAR. 8, 1906.



WITNESSES:

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DANVILL W. STARRETT, OF OAKLAND, CALIFORNIA.

STEAM-ACTUATED VALVE.

No. 870,391. Specification of Letters Patent. Patented Nov. 5, 1907.

Application filed March 8, 1906. Serial No. 304,861.

To all whom it may concern:

Be it known that I, DANVILL W. STARRETT, a citizen of the United States, residing at Oakland, in the county of Alameda and State of California, have invented certain new and useful Improvements in Steam-Actuated Valves, of which the following is a specification.

This invention relates to improvements in Cameron pump valves, the object of the invention being to render said pump less wasteful of steam.

The Cameron pump is much used, because it rarely, if ever, gets out of order, and its installation avoids the delays from stoppage for repairs incidental to the use of other pumps. Its only drawback is that it is wasteful of steam. The object of the present invention is to avoid this objection.

The accompanying drawing is a vertical longitudinal section of a Cameron pump equipped with my improvement.

Referring to the drawing, 1 represents the pump cylinder in which reciprocates the piston 2. At the end of each half of its stroke said piston impinges the stem 3 of an exhaust valve 4, which controls a conduit 5 to the end 6 of a valve chamber and steam chest 7. When the valve 4 is thus moved back, the conduit 5 can communicate by a passage 8 around the stem 3 with a chamber 9 and thence by a conduit 10 with the main exhaust 11. Within the steam chest 7 reciprocates the piston 12 actuating a slide valve 13 and thereby connecting the main exhaust 11 and the steam chest 7 alternately with one or the other of the two ports 14 leading to the ends of the main cylinder. The heads 15 of this piston 12 reciprocating in the ends 6 of the cylinder and steam chest 7 are each formed with a small aperture 16.

In the present improvement the ends of the piston are in the form of hollow cylinders, and within said hollow ends slide the heads 17 of an auxiliary piston 18, said piston heads having apertures 19. On the centers of the outer faces of the piston heads 17 are formed conical plugs 20 which can seat themselves in the conical seats leading to the apertures 16. In the ends of the valve chamber 7 opposite to the apertures 16 are formed sockets to receive the stems 21 of shutters 22, said stems being normally pressed out by springs 23 received in said sockets.

The present improvement consists in the introduction of the auxiliary piston 18, with its apertured heads, and conical plugs on said heads, and also of the spring-actuated shutters 22. To understand the nature of the present invention, it will be desirable to first consider the operation of the Cameron pump without the above additions.

Supposing then, for the present, that said parts which constitute my invention are absent, and that the two pistons 2 and 12 are in the position shown in the figure, the piston 2 moving in the direction of the arrow, then, when said piston 2 strikes the stem 3 of the escape valve it forces it inwards and thereby connects the chamber 6 on the right by port 5, passage 8, chamber 9, and port 10, with the main exhaust 11, and thereby reduces the pressure in said chamber 6 on the right. The moment said pressure falls the pressure in the opposite end forces the valve piston 12 from left to right carrying with it the slide valve 13 and connecting the conduit 14 on the right with the steam chamber 7, and the conduit 14 on the left with the exhaust 11. But while the valve piston 12 is moving from left to right, live steam is always escaping from the steam chest 7 through the aperture 16 and out to the main exhaust through the passages 6, 5, 8, 9, and 10, and it will readily be seen that when the pump is running as much as 100 strokes a minute this loss is almost constant.

Now the advantage of the present invention will be seen by considering the mode of operation with the added parts 18, 17, and 21. With the addition of such parts, when the piston 2 forces the escape valve 4 from left to right, the steam escapes in like manner as before from the right end chamber 6, but the moment that the pressure is lowered in said chamber 6, the steam in the steam chest 7 rushes through the holes 19 and 16, and thereby shifts the piston 18 so as to open the seat 16 on the left and to close that on the right, thereby shutting off all loss of steam through the hole 16, chamber 6 and passages 5, 8, 9 and 10 on the right and the main exhaust 11. At the same time it allows steam to enter the chamber 6 on the left through the holes 19 and 16.

The shutters 22 are an important part of the invention, for when the head 15 of the valve piston 12 reaches the shutter 22 on the right the opening 16 is then closed by said shutter, so that the pressure of the steam compressed in the chamber 6, which forms a cushion to bring the piston 18 to a stop without a jar, cannot throw the piston head 17 from its seat on the right. When the head 15 strikes the shutter 22 and begins to compress the spring 23 on the right there is still space for further compression of the spring 23 on the left to permit the steam to enter behind the head 15 on the left.

I claim:—

1. A fluid pressure engine having a main cylinder, a piston reciprocating therein, a fluid pressure chamber, a valve piston reciprocating therein, its heads having passages for the escape of the pressure fluid, a valve moved by said piston and controlling the ports from said chamber to the cylinder and from the cylinder to exhaust, passages leading from the ends of the pressure fluid chamber to exhaust, escape valves controlling said latter passages and operated by the main piston in its reciprocation, and an auxiliary piston reciprocating within the valve piston and also having passages in its heads, each head of the auxiliary piston adapted to close the head of the valve piston when it moves up thereto, substantially as described.

2. A fluid pressure engine having a main cylinder and a piston reciprocating therein, a fluid pressure chamber and a valve piston reciprocating therein, its heads having passages for the escape of the pressure fluid, a valve moved

by said piston and controlling the ports from said chamber to the cylinder and from the cylinder to exhaust, passages leading from the ends of the pressure fluid chamber to exhaust, escape valves controlling said conduits and operated by the main piston in its reciprocation, and an auxiliary piston reciprocating with the valve piston and also having passages in its heads, the valve piston heads having conical mouths to their apertures, and the auxiliary piston heads having conical plugs adapted to close said mouths, substantially as described.

3. A fluid engine having a main cylinder and a piston reciprocating therein, a fluid pressure chamber and a valve piston reciprocating therein, its head having passages for the escape of the pressure fluid, a valve moved by said piston and controlling the ports from said chamber to the cylinder and from the cylinder to exhaust, passages leading from the ends of the pressure fluid chamber to exhaust, escape valves controlling said conduits and operated by the main piston in its reciprocation, an auxiliary piston reciprocating within the valve piston and also having passages in its heads, each head of the auxiliary piston being adapted to close the head of the valve piston when it moves up thereto, and resiliently supported shutters for closing the passages in the valve piston heads, substantially as described.

In witness whereof I have hereunto set my hand in the presence of two subscribing witnesses.

D. W. STARRETT.

Witnesses:
BESSIE GORFINKEL,
ANNIE PETERSON.