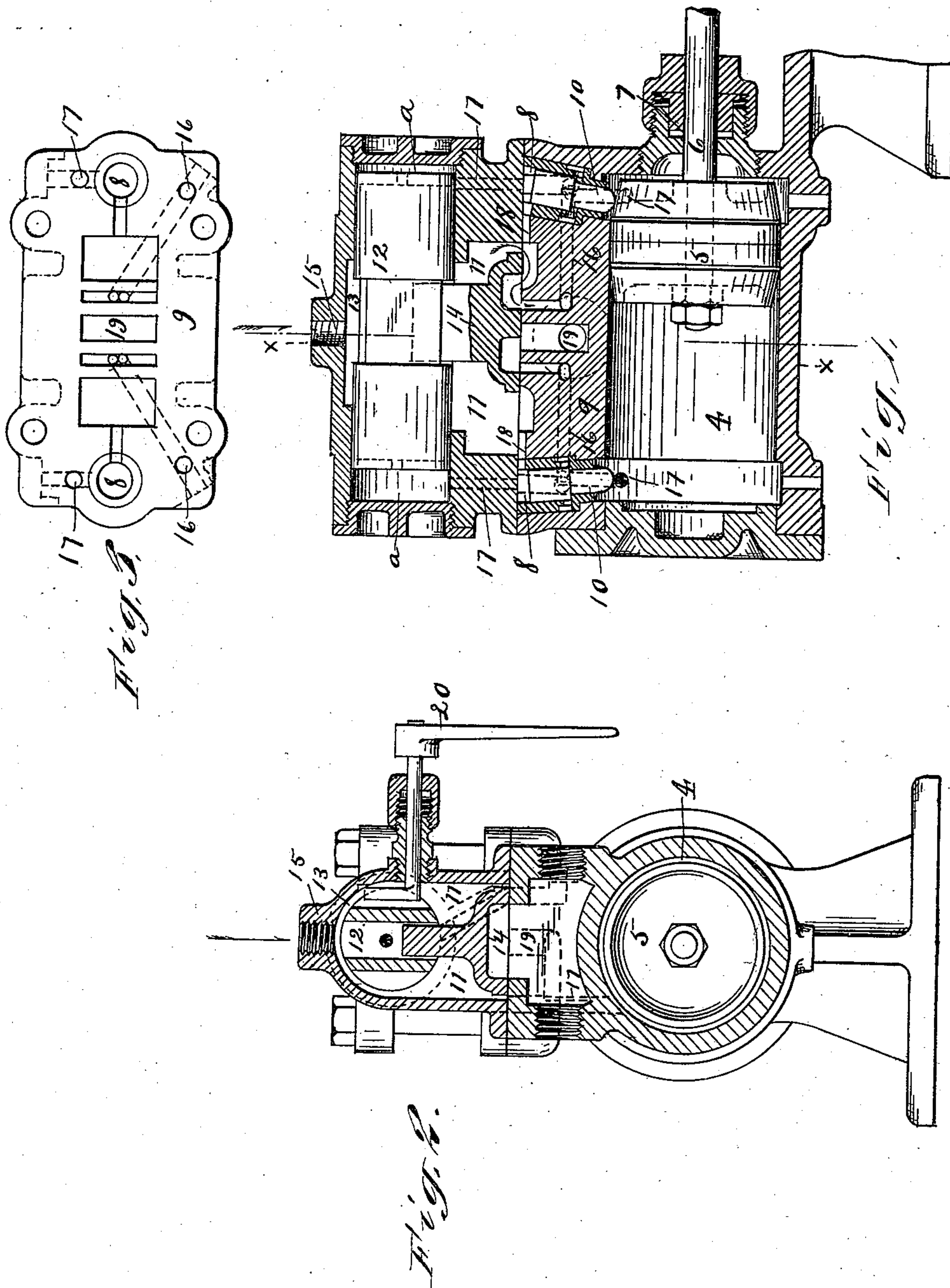


(No Model.)

G. J. ROBERTS.
STEAM ACTUATED VALVE.

No. 501,579.

Patented July 18, 1893.



WITNESSES
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UNITED STATES PATENT OFFICE.

GEORGE J. ROBERTS, OF DAYTON, OHIO.

STEAM-ACTUATED VALVE.

SPECIFICATION forming part of Letters Patent No. 501,579, dated July 18, 1893.

Application filed March 6, 1893. Serial No. 464,848. (No model.)

To all whom it may concern:

Be it known that I, GEORGE J. ROBERTS, of Dayton, county of Montgomery, State of Ohio, have invented a new and useful Improvement in Steam-Actuated Valves for Pumping-Engines, of which the following is a specification.

My invention relates to improvements in steam actuated valves for pumping engines.

10 The object of my invention is to improve the valve and valve actuating mechanism to the end that a material reduction in the wear of these parts is attained, and other economical features gained in the construction and
15 arrangement thereof.

In the drawings herewith presented as supplemental to this specification: Figure 1. represents a vertical longitudinal section of the steam cylinder and chest. The slide-valve appears in section, and the piston thereof appears
20 entire. Fig. 2. is a cross section of the same on the line X—X of Fig. 1. Fig. 3. is a plan view of the valve table with the valves removed from their seats therein.

25 The reference characters used to denote the different parts will indicate the same parts in the different views.

The steam engine illustrated in said drawings and to be herein-after described in the
30 specification, is designed especially for operating a pump for feeding boilers, or pumping liquids against heavy pressure. It may, however, be used with equal success for a variety of purposes.

35 As my improvements are confined to the steam valves and the valve-actuating mechanism as operated by the piston, I will describe specifically, their construction, location and manner of operation, touching only incidentally, upon the well known features of the
40 pump.

The steam cylinder is indicated by figure 4, and is of the usual construction.

5 indicates the piston which is adapted to reciprocate in said cylinder by the motion imparted by the pressure of steam as it enters the cylinder through ports or channels to be
45 herein-after described.

6 indicates the piston rod passing through

the stuffing box 7 to connect with the pump 50 (which is not shown in the drawings).

As an essential feature of my improvement, I provide the piston 5 with a beveled or inclined periphery, the said incline extending to the ends of the piston. 55

8, 8 are cylindrical chambers in and near the ends of the valve-table 9; these chambers communicate with the steam cylinder and occupy a position on an incline of about forty-five degrees thereto; their object is to provide
60 seats for puppet-valves 10, 10 in which said valves are adapted to work up and down; the position of these valves are at angles of about ninety degrees to the beveled surface of the piston, when said piston strikes the ends of
65 the valves, and are retained normally within their seats by steam being conveyed thereto through the channel 18 which exert a constant pressure on the tops of said valves; by the construction of the piston 5 and arrange-
70 ment of the valves 10, 10 as described in the foregoing description, the latter are subjected to a gradual and uniform action, and the frictional wear of these parts, is in consequence, materially lessened, or reduced to a minimum
75 degree, as compared to a vertical or horizontal movement by a piston impinging against the valve in a manner to give it a sharp and quick impetus.

In case of wear, a new casing or seat for the
80 puppet valves can be inserted without disturbing any of the parts.

13 is the steam chest into which steam is conveyed through the inlet 15, leading from the
85 reservoir of supply.

14 is a slide-valve actuated by the piston 12; this piston is provided with a hollow interior, and has inclosed ends through which small openings are provided for the introduction of steam to the extreme ends *a—a* of the
90 steam chest.

16, 16 are ports extending from the steam chambers 11, 11 to the cylinder 4; these ports serve alternately as exhaust and supply channels as the reversing mechanism is operated,
95 as will be herein-after described in the operation.

17, 17 are ports extending from the ends

*a—**a* of the steam chest, to the cylinder, which serve as exhaust channels for said ends.

Describing the operation, it will be noted that steam entering at the inlet 15, fills the chambers 11, 11 and the ends *a—**a* of the chest 13 by passing through the small openings in the ends of the valve-piston 12, and through the channels 18 18 to the upper surfaces of the valves 10 10, which are closed by the pressure of steam thereon. As shown in Fig. 1, the piston has arrived at the limit of its stroke on the right; the puppet-valve 10, on that side, has been lifted by an easy motion imparted by the beveled surface of the piston 5, impinging therewith at an angle of about ninety degrees, allowing the steam contained in the space (*a*) between the valve-piston 12 and the end of the chest 13, to exhaust through the channel 17, and the lowest and smallest portion of the puppet-valve 10, through the exhaust of the engine proper, into the atmosphere at the exhaust pipe 19. The valve-piston 12 and the slide valve 14 are thus instantly reversed, taking the position shown in Fig. 1. The piston 12 is prevented from coming in contact with the end of the chest 13 by passing over the channel 17, and cushioning on the steam remaining in the end (*a*). Steam is now being admitted under the slide-valve 14 into the ports 16 and 17, in the direction of the arrow, which forces the piston to the left. When that end of the stroke is reached by the piston it lifts the puppet-valve 10 on the left, and the same operation is repeated, to-wit, valve 10 on the left is lifted and opened by the inclined surface of piston 5; steam contained in the space between the end of the valve-piston 12 and the end of the chest (*a*) is exhausted through the channel 17 into the steam cylinder 4 and from there into the atmosphere through the channel 16 and main exhaust 19. As the slide valve 14 appears in Fig. 1, the steam is exhausted from the left end of the cylinder.

20 indicates a crank or shift rod by means of which the slide-valve 14 may be started, should it for any reason stick or fail in its reciprocatory motion.

It has been ascertained that the contact of the beveled surface of the piston with the puppet-valve, set as above described, gives most satisfactory results; the movement of the latter, not being effected by the full force of the piston coming suddenly and violently there-against; it moves so effectively as to accomplish fully the object thereof.

Having fully described my invention, I claim and desire to secure by Letters Patent—

1. In a steam actuated valve for pumping engines, the combination with the steam chest and the cylinder, of the valve table 9 having valve chambers 8 8 on an incline substantially as described, puppet valves for said chambers, the live steam channels 18 18 communicating with the valve chest 13 and the upper surface of the puppet valves, as herein specified.

2. In a steam actuated valve for pumping engines, the combination with the cylinder and the steam chest 13 and the slide valve 14, of the table 9 having valve seats 8 8 and puppet valves 10 10 on an incline substantially as described, the exhaust ports 17 17, and the ports 16 16 communicating with the cylinder, the latter ports serving alternately as supply and exhaust channels, the live steam channels 18 18 conveying pressure to normally keep the valves 10 10 within their seats, the piston 4 with beveled periphery, adapted to impinge with the valves 10 10 and effect an angle therewith, substantially as specified.

In testimony whereof I have hereunto set my hand this 2d day of March, 1893.

GEORGE J. ROBERTS.

Witnesses:

HARVEY CONOVER,
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