(No Model.) 4 Sheets—Sheet 1.

E. SMEDLEY.

STEAM ACTUATED VALVE.

No. 304,465. Patented Sept. 2, 1884.

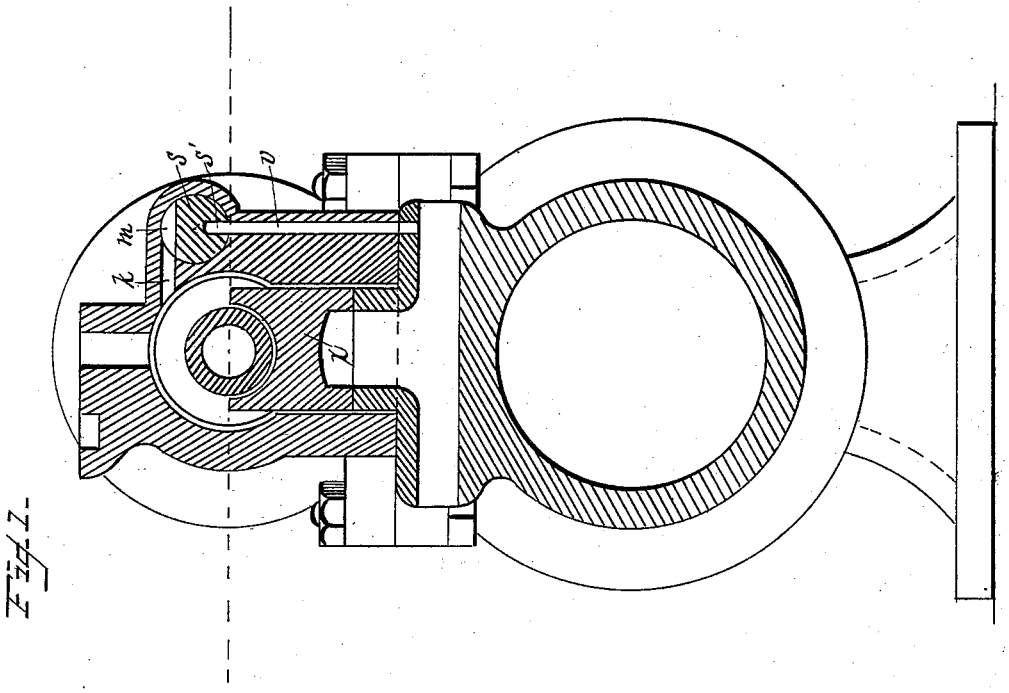

Fig. 1.

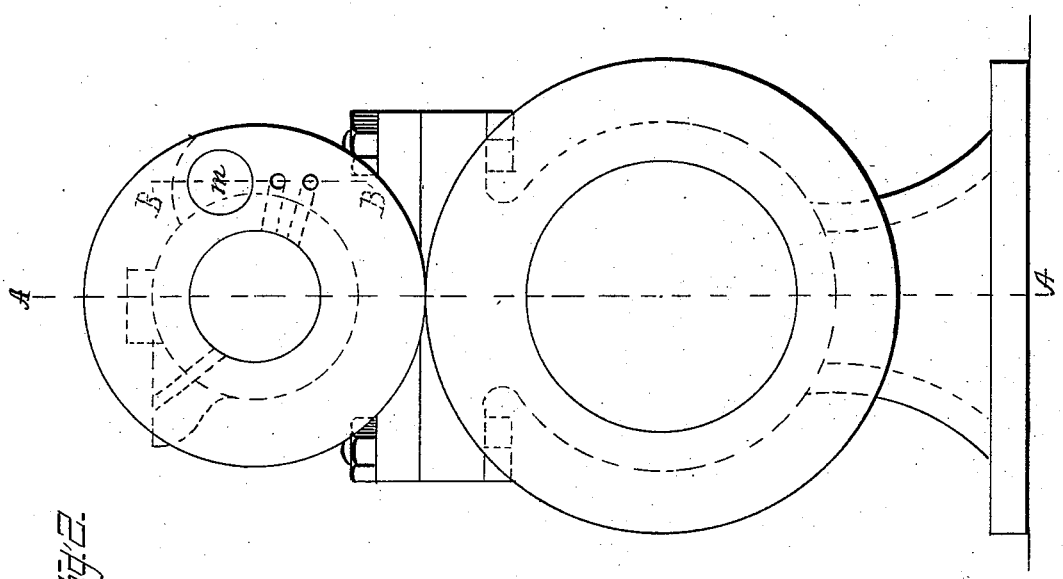

Fig. 2.

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Fig. 1.

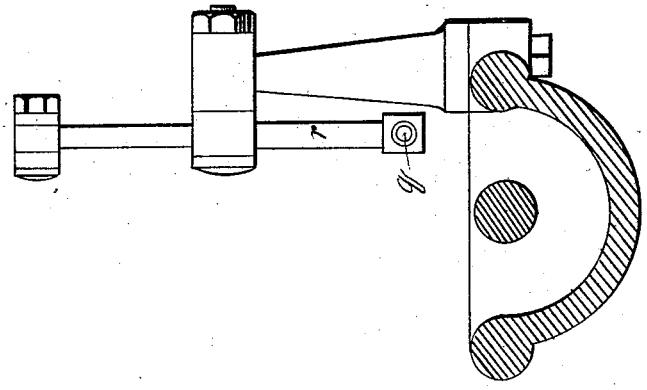
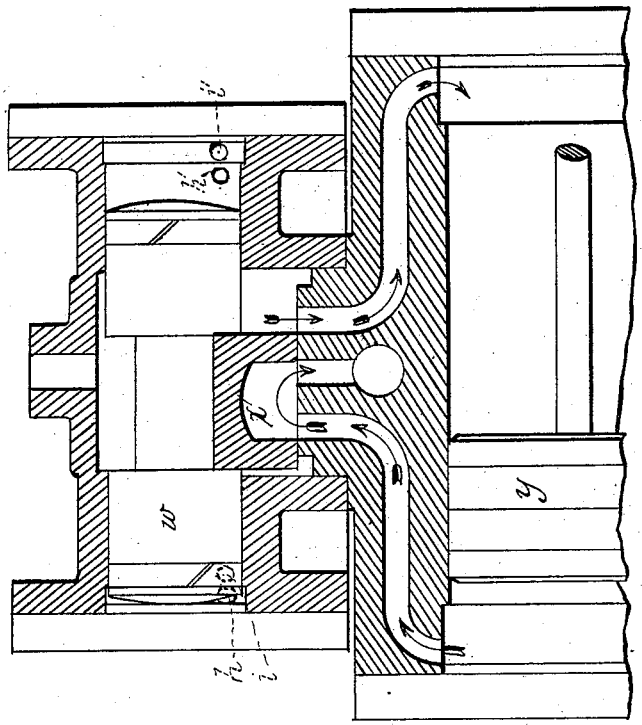


Fig. 2.



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STEAM ACTUATED VALVE.

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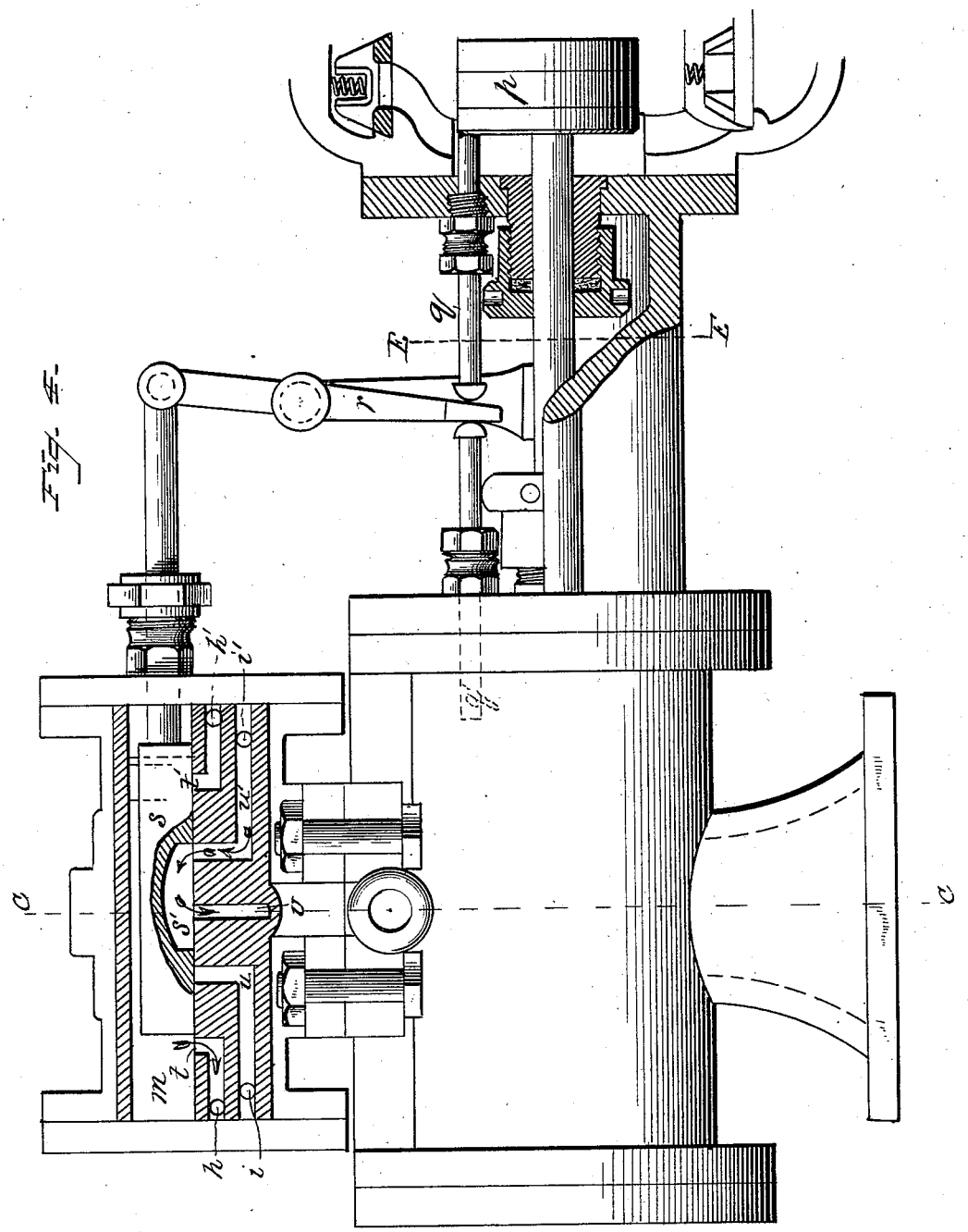

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STEAM ACTUATED VALVE.

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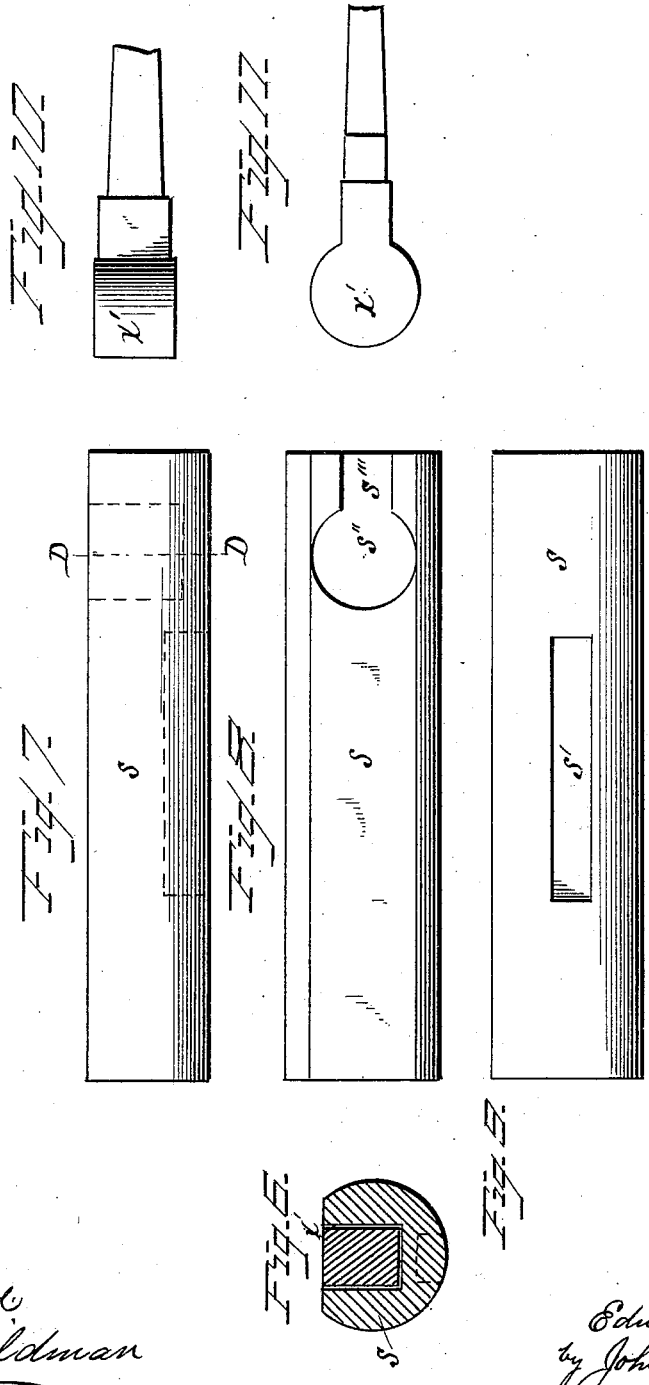

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UNITED STATES PATENT OFFICE.

EDWIN SMEDLEY, OF DUBUQUE, IOWA, ASSIGNOR OF ONE-HALF TO CHARLES H. HUDSON, OF HINSDALE, ILLINOIS.

STEAM-ACTUATED VALVE.

SPECIFICATION forming part of Letters Patent No. 304,465, dated September 2, 1884.

Application filed November 16, 1883. (No model.)

To all whom it may concern:

Be it known that I, EDWIN SMEDLEY, of Dubuque, in the State of Iowa, have invented certain new and useful Improvements in Steam-Actuated Valves; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

My improvements relate to the combination and arrangement of an auxiliary valve, and to the ports and adjacent parts, whereby the piston may be positively cushioned, and without any rebound, and so that the ends of the chamber cannot be struck with the piston, whether laboring hard or doing no work.

In the drawings, which illustrate sufficient of a steam pumping-engine to show my invention, Figure 1 is a vertical cross-section in the line C C of Fig. 4; Fig. 2, an end view of the casings of the cylinders; Fig. 3, a longitudinal vertical section through the line A A of Fig. 2; Fig. 4, a longitudinal vertical section in the line B B of Fig. 2; Fig. 5, a section in the line E E of Fig. 4; Fig. 6, a cross-section of the auxiliary valve in the line D D of Fig. 7. Figs. 7, 8, and 9 are respectively side, top, and bottom views of the auxiliary valve; and Figs. 10 and 11 are side and top views, respectively, of the stem of the auxiliary valve.

The construction need not be particularly described, except with reference to the present improvements.

The water-piston of the pump is shown at *p* in Fig. 4. The stem which it actuates is shown at *q*, and *r* is the lever operated by such stem, and which lever moves the auxiliary valve *s*. This valve *s* and its stem are shown detached in the several views from Fig. 6 to Fig. 11, inclusive, and are also shown in operative positions in Figs. 2 and 4. The valve *s* is made, as shown, with its upper side flat, but otherwise in the form of a cylinder, adapted for the chamber *m*, in which it moves. It has an exhaust-cavity, *s'*, on its under side, and a vertical cylindrical cavity or recess, *s''*, on its upper side, which communicates with a square or rectangular recess, *s'''*, of less diameter than that of the cavity *s''*, such rectangular recess extending to the end of the valve. The stem at the neck or part which connects with this valve is made with a cylindrical head, *x'*, adapted to fit snugly in the cylindrical cavity *s''*, and the part of the stem next to this cylindrical head is made of square or rectangular shape to fit snugly in the rectangular cavity or recess *s''*. This construction and mode of connecting the auxiliary valve with its stem serve to keep the valve in proper place and position, so that it cannot turn, while at the same time the stem takes a firm and positive hold of the valve and makes its motions true. There are also great advantages and economy in this manner of connecting, for no bolt or joint or journal is needed to connect them. The cylindrical hole and the rectangular recess in the valve may be cast in the valve, and are easily finished up, if desired; and the parts are readily put together by simply pressing the neck of the stem into the cavities prepared therefor, and the enlarged or cylindrical end of the stem being larger than the rectangular part, it is impossible to become dislodged when in action, while its removal, when desired, is easily effected by simply lifting it upward upon removal of the head. Ports *t t'* lead from the chamber *m*, as shown, through ports *h h'* (see Figs. 3 and 4) into the piston-valve cylinder, in which works the piston-valve *w*. The exhaust-ports are shown at *u* and *u'*. The piston-valve *w* carries with it a valve, *x*. *v* is an exhaust-port. *i i'* are branch ports communicating with the exhaust-ports *u* and *u'*, respectively. When the water-piston *p* pushes out the stem *q* and moves the lever *r* to actuate the auxiliary valve *s*, (see Fig. 4,) this movement of the valve opens the port *t* and closes the port *t'*, and also opens the exhaust-port *u'* and closes the exhaust-port *u*. Steam is then admitted through the ports *t* and *h* to the auxiliary-piston cylinder, (see Fig. 3,) and which moves the auxiliary piston *w* to the other end of the cylinder, carrying with it the main valve *x*, thus changing the motion of the main piston *y*. When the piston *w* has passed the exhaust-port *i'*, it cushions itself, because the

only remaining port h' is closed by the auxiliary valve s, as shown at t' in Fig. 4. When the main piston y arrives at q', (see Fig. 4,) the same operation is repeated for the return-stroke. This live steam is constantly in the auxiliary-valve chamber m, through the port k. (See Fig. 1.)

Other advantages of this construction, besides those already named, are that the motion is positive, there being no dead-point, and that the machine works as surely and truly at two strokes per hour as when running faster.

A pumping-engine has been made having a cut-off valve for admitting steam from an additional steam-chest through ports, each of which is provided with a branch port controlled by a check-valve; and a T-head has been used on a valve-stem and inserted in a quadrangular cavity made in the interior of an annular piston-head; but, as will be evident, my construction differs essentially from any such construction, and I make no claim to such devices.

I claim—

1. In a steam pumping-engine, the auxiliary piston w, the main inlet and exhaust ports, and the independent double ports $h\ i$ and $h'\ i'$, arranged, as shown and described, for cushioning said piston, in combination with a reciprocating auxiliary valve, all substantially as and for the purposes described.

2. In a steam pumping-engine, the independent double ports $h\ i$ and $h'\ i'$, arranged near the end of the auxiliary-piston chamber, in combination with the main valve x, having pistons w, and with the main inlet and exhaust ports, and with a reciprocating auxiliary valve, s, all substantially as and for the purposes set forth.

3. In a steam pumping-engine, the independent double ports $h\ i$ and $h'\ i'$, arranged as shown, and the main valve x, provided with pistons w, in combination with an auxiliary valve, s, arranged as shown, and having an endwise movement only, all as set forth.

4. The auxiliary valve s, having an endwise reciprocating movement, and its valve-chamber m, communicating by independent ports $t\ h$ and $t'\ h'$ with the auxiliary-piston chamber, in combination with the ports $u\ i$ and $u'\ i'$ and the exhaust-port v, all arranged and the combination operating substantially in the manner and for the purpose specified.

5. A valve-stem having a cylindrical head or part, x', and a smaller rectangular part, z, next adjacent thereto, fitting into a correspondingly-shaped vertical cylindrical recess, and in a rectangular recess in the top of the valve, and terminating in a round or ordinary stem, as shown and specified.

6. The combination of a valve-stem having a cylindrical part, x', and the rectangular part z, terminating in an ordinary stem, with a solid cylindrical valve having a cylindrical recess in its exterior, communicating with a smaller but rectangular recess in its exterior, extending to the end of the valve, and adapted to receive said cylindrical and rectangular part of the valve, all substantially as set forth.

7. The combination of an auxiliary valve provided with a recess of cylindrical form made in its exterior or periphery, terminating in a rectangular recess, open at one end, and into which recesses the end of a stem fits, with a main valve having piston ends and a series of ports, arranged in the manner shown and specified.

8. A cylindrical valve having its upper side flat and provided with an exhaust-cavity, and having the quadrangular and cylindrical communicating recesses at one end, formed as shown and described, in the top of the valve to receive the end of a valve-stem, all as and for the purpose specified.

9. A pumping-engine having a pumping-cylinder and a steam-cylinder provided with a series of double and independent inlet and outlet ports, arranged as shown, a main valve, x, provided with pistons w, and an auxiliary valve, s, provided with a valve-stem having a cylindrical head connecting with a rectangular portion of the stem, such head and rectangular part fitting snugly into a correspondingly-shaped cylindrical recess in said valve s, all as and for the purposes set forth.

EDWIN SMEDLEY.

Witnesses:
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JNO. H. WOOD.