

3 Sheets—Sheet 1.

No. 475,900.

Patented May 31, 1892.



Witnesses,

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(No Model.)

3 Sheets—Sheet 2.

F. M. SCHORN.
STEAM ACTUATED VALVE.

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Fig. 4.

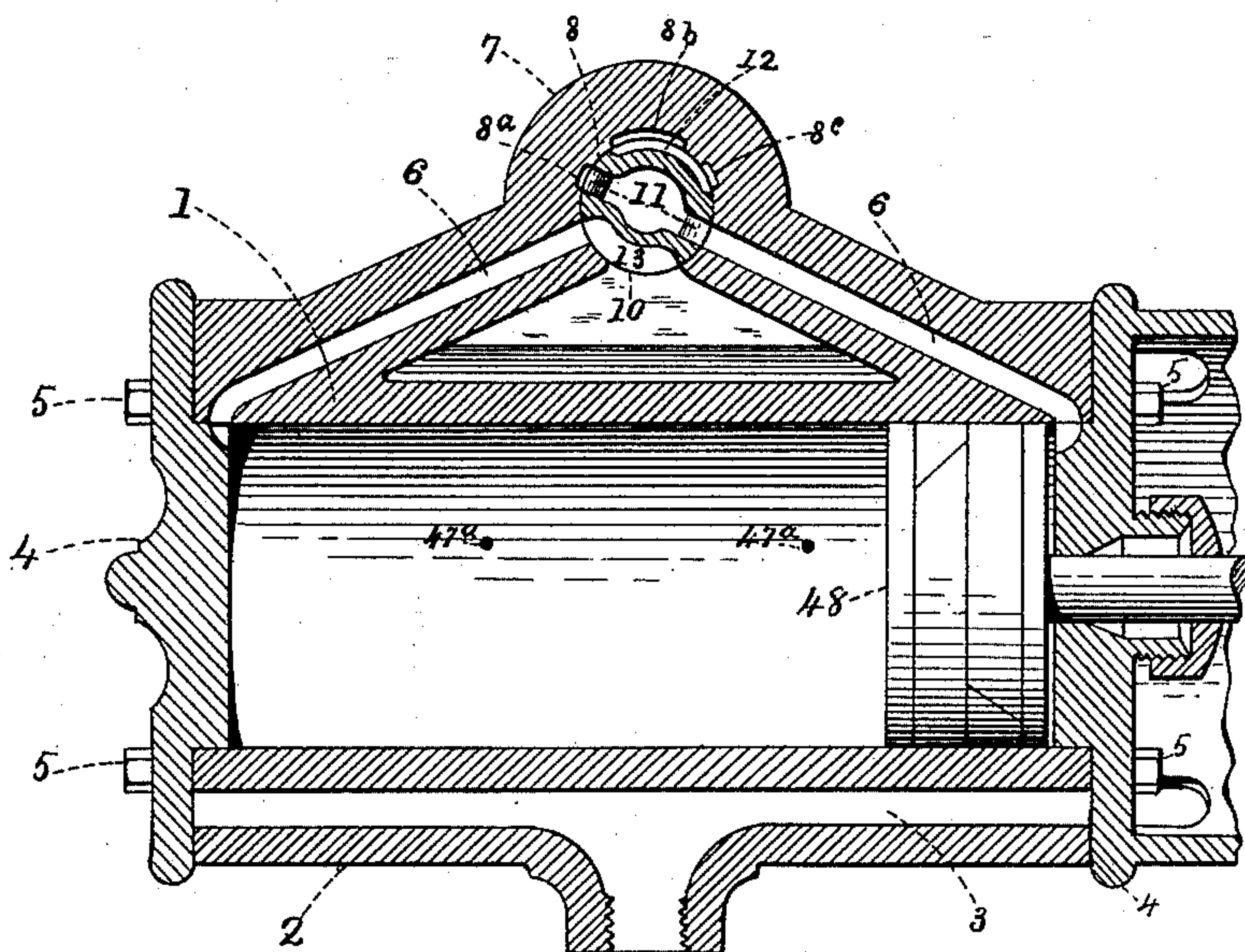
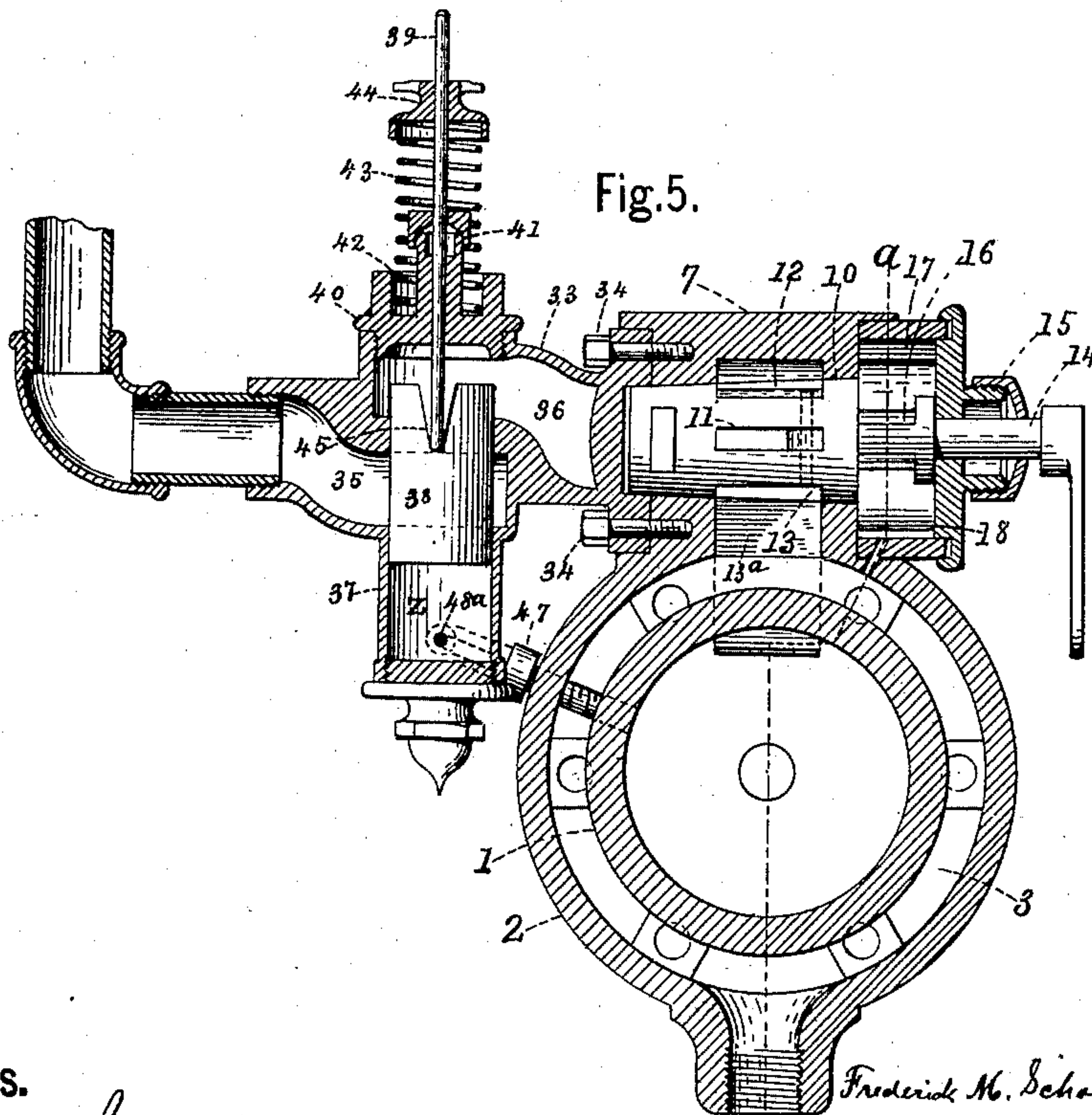


Fig. 5.



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Fig. 6.

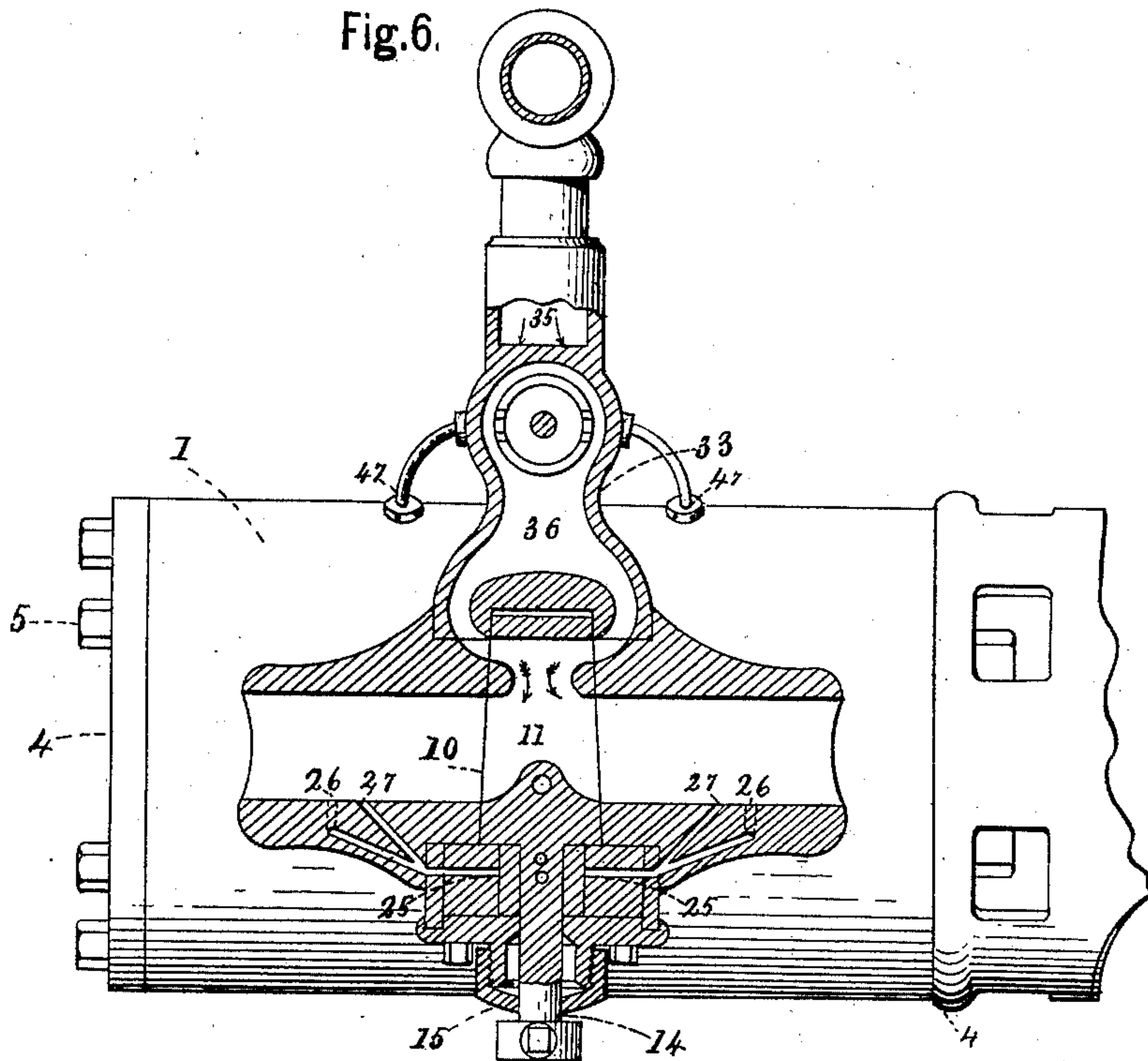


Fig. 7.

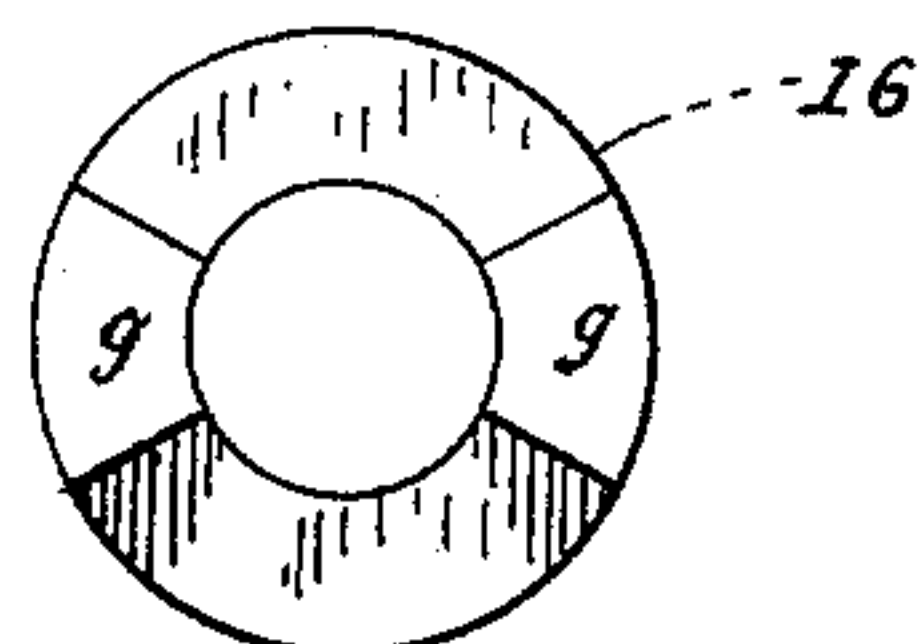


Fig. 9.

Fig. 8.

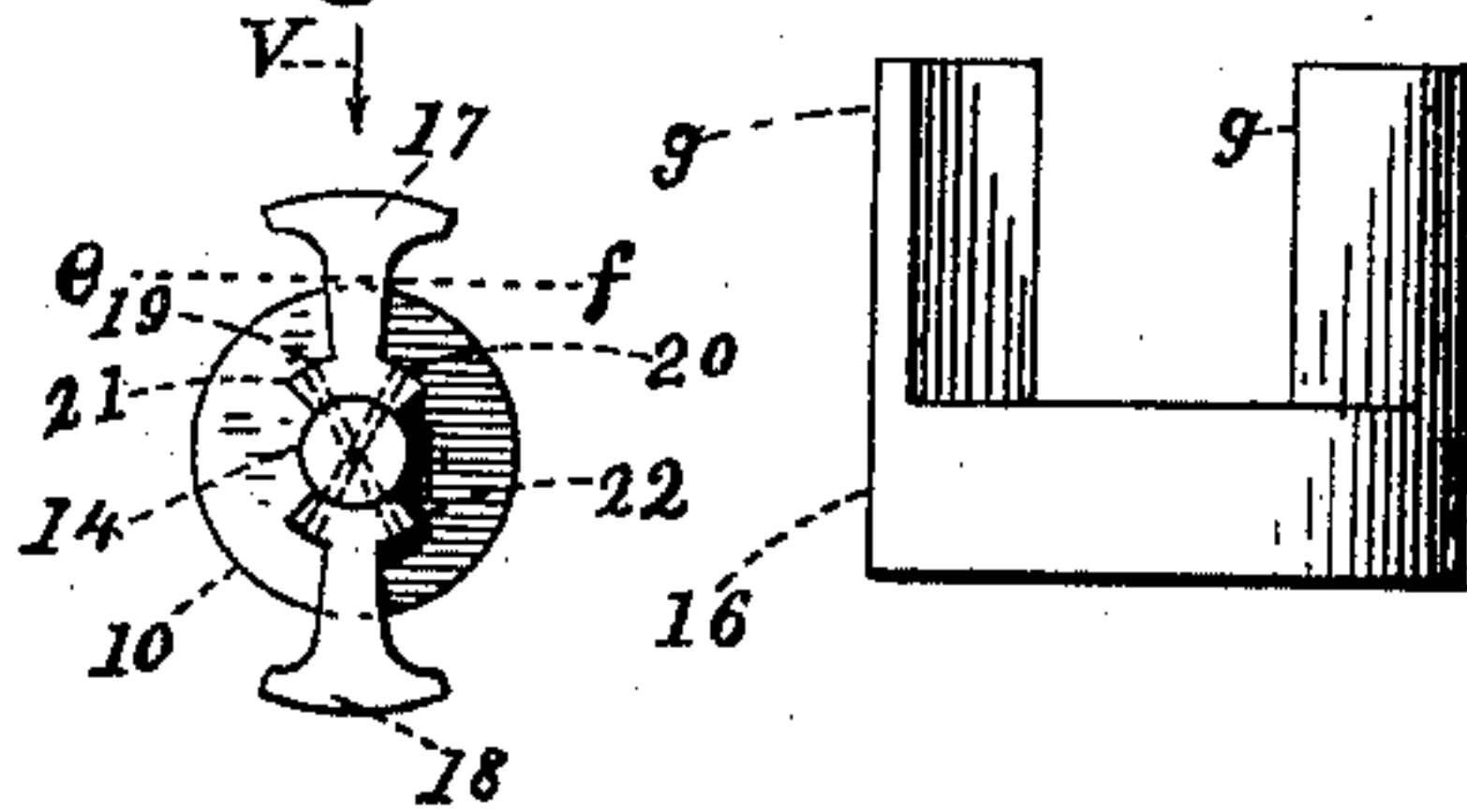
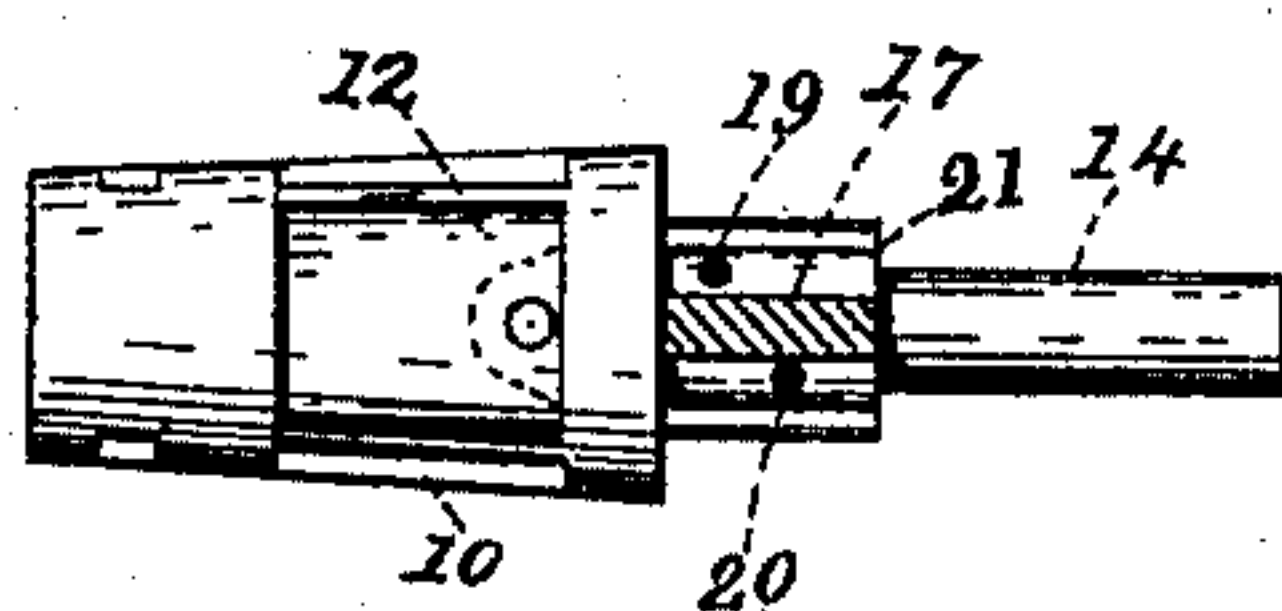


Fig. 10.



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UNITED STATES PATENT OFFICE.

FREDERIK M. SCHORN, OF BUFFALO, NEW YORK.

STEAM-ACTUATED VALVE.

SPECIFICATION forming part of Letters Patent No. 475,900, dated May 31, 1892.

Application filed August 24, 1889. Serial No. 321,871. (No model.)

To all whom it may concern:

Be it known that I, FREDERIK M. SCHORN, a citizen of the United States, residing in Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Steam-Actuated Valves, of which the following is a specification.

The object of my invention is to produce an engine in which all the required movements of the valve are produced by the action of the steam alone without the use of an eccentric or any of its connecting parts, all of which will be fully and clearly hereinafter described and claimed, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of the engine complete. Fig. 2 is a vertical longitudinal section through the cylinder of the engine in or about line *b*, Fig. 5, cutting through the actuating portion of the main valve, cutting also through its steam-ports and through the cylinder. Fig. 3 is a vertical longitudinal central section through the main valve and a portion of the cylinder. Fig. 4 is a vertical longitudinal central section cutting through the main valve and through the cylinder. Fig. 5 is a cross-section through the cylinder, the valve-seat of the main and its operating valve, and the mechanism for controlling the amount of steam admitted to the engine. Fig. 6 is a horizontal section through the upper portion of the cylinder in or about line *c d*, Fig. 3. Fig. 7 is an end view of the actuating-valve. Fig. 8 is a front view of the valve and its operating segmental wings. Fig. 9 is a side elevation of the actuating-valve. Fig. 10 is a plan view of the main valve and a portion of its operating-valve, looking in the direction of the arrow *v*, Fig. 9, showing, also, a section through line *e f*, Fig. 9.

The engine consists of the usual cylinder, piston, piston-rod, and connections. A jacket is cast around the cylinder, taking the place of the usual exhaust-port, and the exhaust-port and exhaust-pipe are located opposite the valve, so as to pass the exhaust-steam entirely around the cylinder. This jacket connects with the cylinder at the steam-ports and by the usual bridges, into which the head and frame bolts are tapped at either end.

In the drawings, 1 represents the engine-cylinder. It is preferably made of cast-iron

and is provided with a surrounding jacket 2, thereby leaving a surrounding steam-space 3. The cylinder-heads 4 are secured to the ordinary way by bolts 5. The engine is also provided with the usual steam-ports 6. At the top of the cylinder is a case 7, containing the steam-valve seat 8, having recesses or blind ports 8^a 8^b 8^c, (shown in Figs. 3 and 4,) and the actuating valve-chambers 9 9^a. (Shown in Fig. 2.)

In carrying out my invention I employ, preferably, a slightly-tapering valve 10; but it may be a straight cylindrical valve, if desired. The object in making it tapering is to provide the means for fitting it nicely to its seat 8, which is made of corresponding form to receive it. Through the steam-valve (which is composed of a main body and an actuating portion) is a transverse opening or distribution-port 11, (see Figs. 3, 4, 5, and 6,) and on the top side is a recess or "blind port" 12, at the under side of the valve is a recess or exhaust-port 13, and below the valve is an exhaust-port 13^a, opening into the cylinder. (See Fig. 5.) The valve-stem 14 passes through the actuating-valve 16 and through a stuffing-box 15. (Shown in Fig. 5.) Above and below the actuating-valve are two chambers 9 and 9^a, (see Fig. 2,) in which the actuating-valve 16 and the two segmental wings 17 and 18 for operating the engine-valve are located so as to work steam-tight. If desired, the segmental wings may be provided with a packing of any well-known kind for insuring a close joint and allowing for any expansion of the same by heat. The segmental wings 17 and 18 are attached to or form a part of the engine-valve, and are provided with ports 19 and 20, which pass through the projecting segmental lugs 21 22 and valve-stem (see Figs. 9 and 11) and communicate with the upper and lower chambers 9 and 9^a. The bearing-faces of the wings 17 and 18 are both of the same area, and the bearing-face of the wing 18 is so proportioned to the size of the chamber 9^a that its opposite edges will alternately pass by the actuating-valve exhaust-port 23, as shown in Fig. 2, during its partly-rotating reciprocating motion in the chambers 9 and 9^a. It moves with the valve 10 the proper distance to bring the respective distribution-ports into full connection or directly opposite

the corresponding steam-port, as shown at the steam-port 6 and the distribution-port 11 in Fig. 4. The steam-valve ports connect with the chambers 9 9^a by ports 25 and with the cylinder at the points 26 just inside of the piston when at the end of the stroke, thereby conducting steam into the chamber 9^a, and from thence to the chamber 9 through the port 19, thus producing a pressure on the segmental wings 17 and 18, so as to turn the steam-valve in one direction, thereby producing a change in the distribution and exhaust of the steam of the engine. The segments *g* upon the actuating-valve shut off the supply of steam to the valve-chamber at the completion of the stroke and connect with the other end of the cylinder for the return stroke. The steam in the valve-chambers 9 9^a, after completing its work, exhausts through the exhaust-port 23 in the center of the chamber 9^a at the bottom of said chamber into the steam-space 3 within the jacket 2. The steam in the cylinder is the motive power actuating or operating the valve 16 for the first half of its throw; but being then exhausted the expansion of the steam in the valve-chambers 9 9^a and the momentum of the valve complete its throw. To insure a full action of the actuating-valve, the steam-ports and valve-ports are connected by auxiliary valve-ports 27, (shown in Fig. 6,) and live-steam pressure is admitted to said valve-chambers at the same instant the cylinder-pressure exhausts.

The operation of the engine-valve is as follows: The valve 10 is by means of the pointer 28 (shown in Fig. 1) set to either one side or the other, according to the direction it is intended to run the engine. If it is intended to run it in the direction of the arrow 31, (see Fig. 1,) it is set as shown at 29 in said Fig. 1. If it is desired to run it in the opposite direction or in the direction of the arrow 32, then the pointer is moved to the dotted-line pointer 30, which would bring the valve and ports to the position shown in Figs. 2 and 4. The engine may be started in either direction by setting the engine-valve by means of the pointer 29, as before mentioned, or it may be reversed by changing the position of the engine-valve by moving said pointer during the stroke.

The cut-off is constructed as follows: At the points where it is desired to cut off the steam communication is made between the engine-cylinder and the cylinder of the pressure-regulator by means of the pipes 47, connecting with both. (See Figs. 5 and 6.) The engine-piston 48 on passing over this port admits steam to the under side of the regulating valve-piston 38, thus balancing all pressures, and thereby leaving the spring 43 free to act and close the valve and cut off a further supply of steam. Upon reaching the end of the stroke the steam exhausts through the engine cylinder and valve, and the regulating-pressure above acts upon the piston 38 and spring 43 as before. The termination of the

pipes 47 or the openings through them is shown in Figs. 2 and 4 and by dotted lines in Fig. 5. One of these openings, leading into the regulating-cylinder 37, is shown within the chamber *z* at 48^a in Fig. 5. There are two of such openings within said cylinder through the two pipes 47. (Shown in Fig. 6.) When the load is constant—as, for instance, in a pump—the cut-off may be dispensed with.

I claim as my invention—

1. In a steam-engine, the combination of a valve-seat provided with blind ports 8^a 8^b 8^c, an engine-valve nicely fitting the valve-seat, having exhaust and distributing ports for conducting steam to and from the engine, segmental wings rigidly connected with the engine valve-stem and provided with portions 21 22, having ports 19 and 20, the segmental wings fitting the valve-chamber 9 9^a, an actuating-valve mounted so as to turn on the valve-stem between the shoulders 21 22, and ports for alternately admitting steam from the interior of the cylinder and exhausting it, and thereby operating the main or engine valve, substantially as described.

2. In a steam-engine, the combination, with the engine-valve, of a valve for giving it its proper movements, consisting of two segmental wings fitted steam-tight within a valve-chamber and provided with ports 19 20, an actuating-valve mounted so as to have an oscillating movement on the valve-stem between the shoulders 21 22, an exhaust-port 23, and ports for alternately admitting steam to opposite sides of the segmental wings, substantially as above described, and for the purposes set forth.

3. In a steam-engine, the cylinder, the engine, engine-valve, and ports 6 for conducting steam to alternate sides of the steam-engine piston and the exhaust-port, in combination with another valve for operating the engine-valve, consisting of the segmental wings provided with two ports, and an actuating-valve mounted on the main valve-stem, steam-ports for conducting steam from the interior of the cylinder, and an exhaust-port 23, for the purposes described.

4. In a steam-engine, the combination, with the engine, of a pressure-regulating valve fitted within a valve-case and provided with openings to admit steam to the engine, a spring for keeping the valve up to its normal position when there is no pressure of steam on the top of the valve, and pipes having openings which communicate with the chamber *z* below the valve-piston 38 and with the interior of the cylinder at the point of cut-off, whereby when the engine-piston passes these openings or ports all pressures are balanced, so that the spring is free to act and close the valve, thereby cutting off the steam, substantially as described.

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