

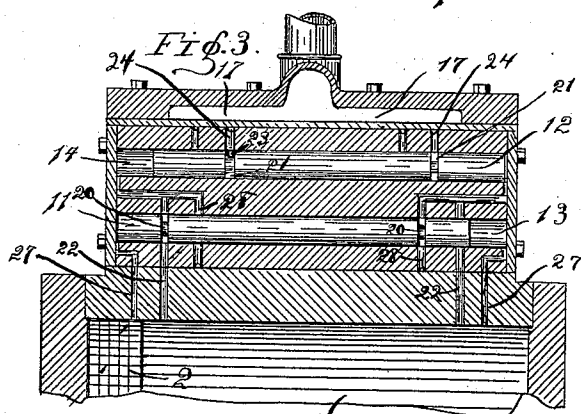
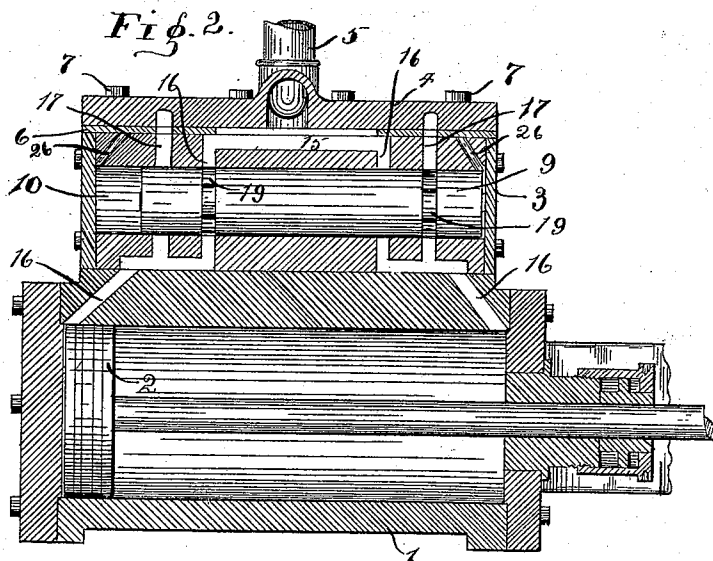
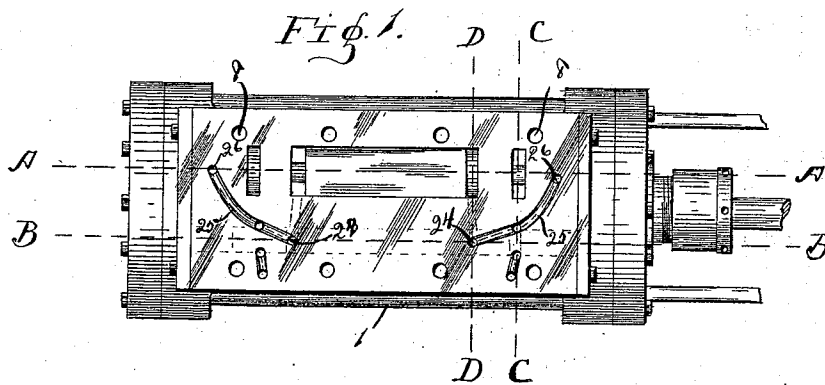
(No Model.)

2 Sheets—Sheet 1.

G. H. WILLIAMS.  
STEAM ACTUATED VALVE.

No. 552,081.

Patented Dec. 24, 1895.



Witnesses  
Geo. C. Comer.  
L. A. Monroe.

Inventor  
George H. Williams  
By Attorney W. H. Lockwood

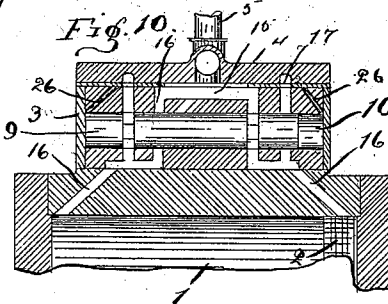
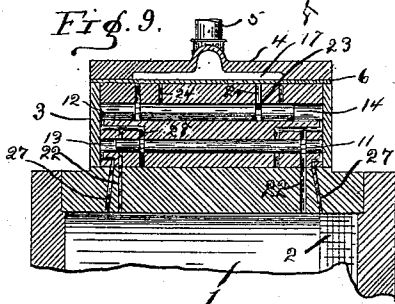
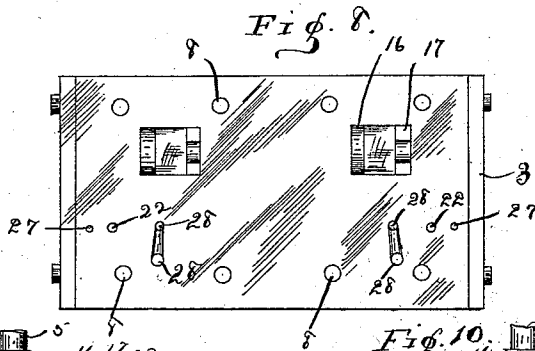
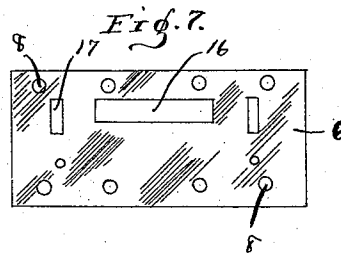
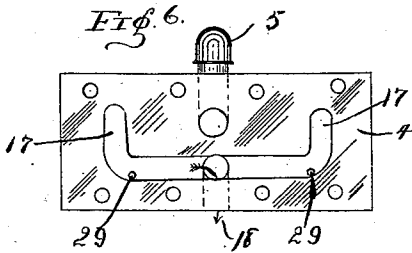
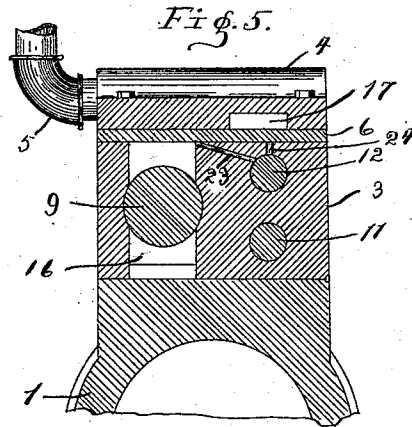
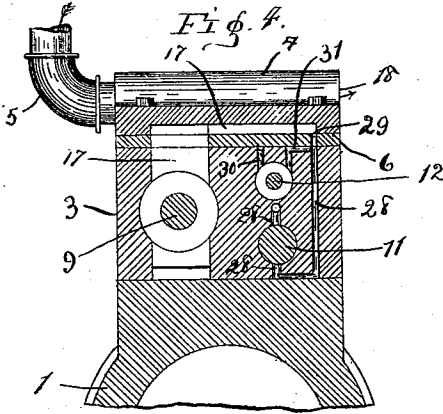
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2 Sheets—Sheet 2.

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Witnesses  
Geo. Clouner,  
L. A. Monroe.

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George H. Williams  
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# UNITED STATES PATENT OFFICE.

GEORGE H. WILLIAMS, OF MARION, INDIANA, ASSIGNOR OF ONE-HALF TO  
EDGAR H. JOHNSON, OF SAME PLACE.

## STEAM-ACTUATED VALVE.

SPECIFICATION forming part of Letters Patent No. 552,081, dated December 24, 1895.

Application filed March 20, 1895. Serial No. 542,463. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE H. WILLIAMS, of Marion, county of Grant, and State of Indiana, have invented a certain new and useful Steam-Actuated Valve; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which like numerals refer to like parts.

My invention relates to a steam-actuated valve which in construction is wholly independent of the piston and is so arranged that it will admit steam to the cylinder and exhaust it and avoid centering the piston. I use a series of piston-valves so provided with passage-ways from each other and the steam chamber and cylinder that they and the piston will coact successively on each other and thus prevent the centering of the piston. The construction is such also that it is very economical and of small dimensions. I have used it in connection with a steam-pump; but it can be used with any other steam-engine. The full nature of its construction and mode of operation will be understood from the accompanying drawings and the description following.

Figure 1 is a plan view of the steam-chest with the cover and gasket removed. Figs. 2, 3, 4 and 5 are sections on the lines A A, B B, C C, and D D, respectively, of Fig. 1. Fig. 6 is a bottom view of the steam-chest cover, showing the exhaust-ports. Fig. 7 is a plan view of a metal gasket interposed between the steam-chest and its cover. Fig. 8 is a bottom view of the steam-chest. Figs. 9 and 10 are the same as Figs. 2 and 3, excepting that they show the position of the valves when the piston is at the opposite end of its stroke.

I show here an ordinary cylinder 1 and piston 2. On the cylinder is mounted a steam-chest 3 having a cover 4, to which is connected a steam-pipe 5. Between the cover and steam-chest is a metal gasket 6. The parts are connected in the usual way by bolts 7 through holes 8. Within the steam-chest I provide a main piston-valve 9 moving in its valve-chamber 10, and also two smaller auxiliary piston-valves 11 and 12 moving in the valve-chambers 13 and 14, respectively. Above the valves and the gasket 6 is a steam-chamber

15. Extending from the steam-chamber 15 through the steam-chest to the cylinder are the steam-ports 16, and extending from the cylinder are the exhaust-ports 17, which are first vertical and then horizontal, as seen in Fig. 6, leading out at 18.

Between the steam-chamber 15 and the various valves 9, 11 and 12 and the cylinder are a number of passage-ways for the passage of steam, whereby it is enabled to actuate such valves *seriatim* and prevent centering. These passage-ways in one end of the steam chest and cylinder are the same as those in the other end thereof and they are all made straight, in order that the device may be economically constructed. By placing the steam-chest in a drill-press and by using jigs it is seen that although the number of passage-ways may seem great they may be very quickly made. To register with these passage-ways, as well as the steam and exhaust ports, the valve 9 is provided with the annular grooves 19, the valve 11 with the annular grooves 20 and the valve 12 with the grooves 21. The arrangement of these passage-ways and the operation of the device will be understood from the following explanation: Suppose the piston is at the forward end of its stroke, as shown in Figs. 2 and 3, and the valves are in the positions shown. The steam entering the cylinder passes through the annular groove 20 in the auxiliary valve 11 up into the end of the valve-chamber 14, behind the auxiliary valve 12, and drives it to the position shown in Fig. 3. Then the annular groove 21 in the valve 12 opens the passage-way 23, allowing the steam to enter from the steam-chamber 15 through the passage-ways 24, 25 and 26 into the end of the main valve-chamber 10, whereby it drives the main valve 9 to the position shown in Fig. 2, at the same time such auxiliary valve 12 opening the passage-way at the other end of the steam-chest to exhaust the other end of the valve-chamber 10. When the valve 9 is moved to the position shown in Fig. 2, the annular groove in one end registers with the steam-port 16 and at the other end with the exhaust-port 17, allowing the steam to be fed to the cylinder directly and exhausted therefrom.

So far the auxiliary valve 11 has not been

acted upon; but as soon as steam is introduced to drive the piston back from the position it occupies in Fig. 2 steam passes through the passage-way 27, as shown in Fig. 3, that leads into the end of the valve-chamber 13 behind the valve 11, whereby it is driven into the position shown in Fig. 9, and the annular groove 20 in the valve 11 registers with the passage-way 28, through which steam is exhausted from the end of the valve-chamber 14, as shown in Figs. 3, 4 and 8, allowing the valve 12 to be moved back. At the same time it opens the passage-way 22 at the other end of the steam-chest, allowing the steam to enter the other end of the valve-chamber 14 behind the valve 12. From this point on the process which has heretofore been described is repeated as the piston moves backward and forward.

To recapitulate the passage-ways for conducting live steam: There is a passage-way from the cylinder to the end of the chamber 14 that passes through the auxiliary valve 11, a second passage-way between the steam-chamber 15 and the main valve-chamber 11 going through the auxiliary valve 12. There is the main steam-port from the steam-chamber 15 through the main valve to the cylinder, and, fourth, a passage-way from the cylinder to the end of the valve-chamber 13.

The following passage-ways and ports exhaust the steam: First, there is an exhaust passage-way 28 from the end of the chamber 14 that goes through the valve 11. In the second place, there is an exhaust passage-way from the main valve-chamber 10 through the passage-ways 26, 25, 30 and 31 and going through the valve 12. Third, there is a main exhaust-port 17 from the cylinder that goes through the main valve 9. In the fourth place, there is the exhaust passage-way 27 from the end of the chamber 13 into the cylinder. This valve mechanism may be entirely independent of the cylinder and I have used it in that

way. In such case the passage-ways 22 and 27 will extend from the main steam-ports instead of from the cylinder.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination with a steam cylinder and piston, of a steam actuated valve mechanism comprising a steam chest provided with chambers or secondary cylinders extending parallel with the main cylinder and passage ways connecting the chambers or cylinders and steam inlet, and the piston valves 9, 11 and 12 fitting in said chambers so as to slide therein and shut off or open up the passage ways, the passage ways and valves being arranged in such order that the steam will act upon them in succession, substantially as set forth.

2. The combination with a steam cylinder and piston of a valve mechanism comprising a main piston valve and two auxiliary valves, a steam chest provided with a steam passage way leading from the cylinder through the valve 11 into the valve chamber 14, another from the steam chamber 15 through the valve 12 into the main valve chamber 10, another from the steam chamber 15 through the main valve 9 into the cylinder and another from the cylinder into the valve chamber 13, and an exhaust passage way from the valve chamber 14 through the valve 11 into the exhaust port 17, another from the main valve chamber 10 through the valve 12 into the steam port 17, another, the main exhaust port, from the cylinder through the main valve 9 and another from the valve chamber 13 into the cylinder, substantially as shown and described.

In witness whereof I have hereunto set my hand this 2d day of March, 1895.

GEORGE H. WILLIAMS.

Witnesses:

V. H. LOCKWOOD,  
L. A. MONROE.