

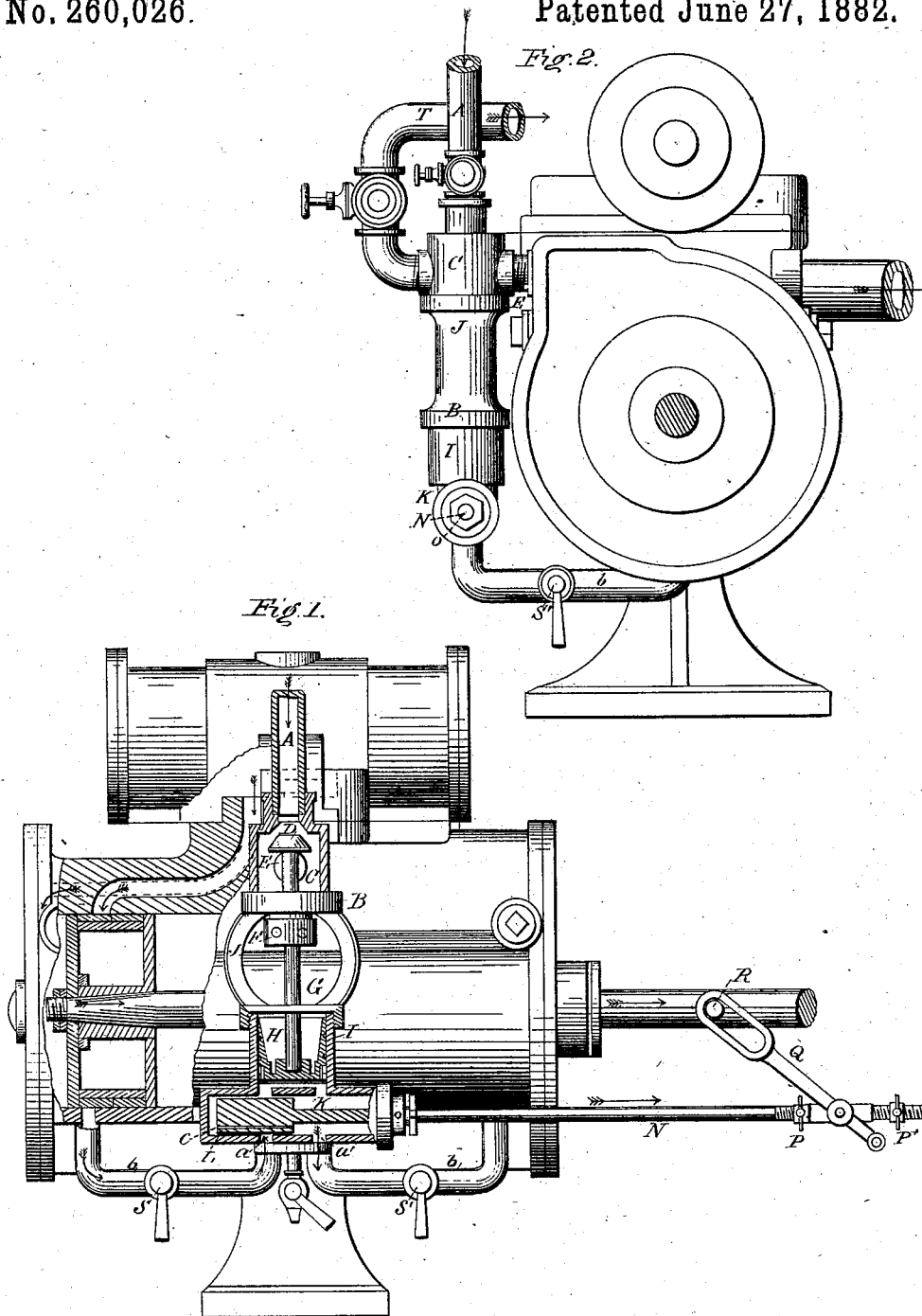
(No Model.)

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ADJUSTABLE STEAM CUT-OFF VALVE.

No. 260,026.

Patented June 27, 1882.



Witnesses  
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# UNITED STATES PATENT OFFICE.

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## ADJUSTABLE STEAM CUT-OFF VALVE.

SPECIFICATION forming part of Letters Patent No. 260,026, dated June 27, 1882.

Application filed September 16, 1881. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM DAVIS HOOKER, 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 Adjustable Steam Cut-Off Valves for Direct-Acting Pumping-Engines, of which the following is a specification.

My invention relates to that class of cut-off devices that are actuated by steam and controlled by the main piston and main valve of a steam-engine; also, in providing the cut-off with a controlling-valve, which is operated by suitable mechanism from the main piston; also, by the use of adjustable stops connecting the controlling-valve with the main piston of the engine. The steam can be cut off from the engine at any desired point in the last half of the stroke of the main piston, thereby utilizing its expansive power to complete the stroke, as in other cut-off engines. When, as in direct-acting pumping-engines, the resistance is constant, and when the velocity is moderate and there is no fly-wheel to resist and equalize the momentum of the moving parts, I find the best economy is in not cutting off the steam earlier than at some point in the last half of the stroke of the main piston, thus slowing down the pumping-engine at the termination of its stroke and allowing the valves to fall gently upon their seats, and the pumping-cylinder to fill with water before the main piston commences its return-stroke. The proper cut-off point is easily determined by setting the adjustable stops in their correct position, and when properly adjusted I find great economy of steam and smooth and noiseless working of the pump.

I also provide suitable intermediate connecting mechanism from the main piston to the controlling-valve of the cut-off, so that said controlling-valve shall move in unison with the main piston when operated by the same, but in a much shorter or reduced length of stroke. I also provide means for balancing the controlling-valve when exposed to the pressure of steam, so that the valve can move freely throughout its stroke. I also provide suitable valves to regulate, open, and close the communication between the engine-cylinder and the cut-off. When the valves are closed the cut-off is inoperative.

Having set forth the object of my invention, I will now describe the same.

In the accompanying drawings, in which similar letters of reference indicate similar parts throughout, Figure 1 is a view of a steam-engine, partly in section, showing the main piston in cross-section, a longitudinal section of the main valve and main ports of the engine, also a front view of the separate cut-off device connected to the engine with its controlling mechanism, and the yoke connecting the upper and lower parts of the cut-off-valve chest. The controlling-valve, piston, and cylinders, and the cut-off valve are shown in section. Fig. 2 is an end view of the steam-engine with the separate cut-off instrument.

A is the pipe connecting the cut-off-valve chest B with the boiler. C is the cut-off cylinder; D, the cut-off valve; E, the pipe connecting the cut-off-valve cylinder with the main steam valve-chest, through which steam is supplied to drive the engine; F, the small stuffing-box, through which passes the cut-off-valve rod G. This rod has a small piston, H, attached to its opposite end and fitting in cylinder I.

J is a yoke securing the cut-off-valve chest and piston-cylinder together.

K is a small horizontal cylinder, made or cast with cylinder I, in which cylinder works the controlling piston-valve L. This cylinder K has two ports, *a a'*, passing directly through it into cylinder I.

*b b'* are pipes connecting ports *a a'* with the main engine near each end, and through these passages and pipes the steam is supplied and released to and from the main engine-cylinder and cylinder I. The steam enters this cylinder I from the main cylinder through the pipes *b b'* and ports *a a'*, across horizontal cylinder K.

L is the controlling piston-valve, having a small port, *c*, passing through it for the purpose of equalizing the pressure of steam at the ends of the valve L, and allowing any water trapped at either end of the valve to pass through also. To this controlling-valve is fastened a small valve-rod, N, which passes through the stuffing-box *o*. The opposite end of the rod passes loosely through the oscillating bearing, and is provided with adjustable stops P P'. The oscillating lever Q is pivoted at one end,

and works on pin R on the piston-rod and serves to give the required stroke to the controlling-valve, making it work in unison with the main piston when operated by it.

5 By the use of the adjustable stops the steam can be cut off from the engine at any point desired; or by closing the small valves *s s'* the cut-off becomes inoperative, and the engine will be driven by live steam throughout its entire length of stroke. The cut-off is then disconnected from the engine and has no effect upon it.

15 When two steam-engines are employed, as in duplex pumping-engines, by simply connecting the secondary engine by a steam-supply pipe, T, with the cut-off-valve cylinder of my improved cut-off the steam will be cut off from both engines simultaneously, and each will finish its stroke by the expansive power of the steam.

20 The operation of this improved cut-off is as follows: When the main piston is just commencing its stroke the controlling-valve L of the cut-off is in the position shown in Fig. 1. Steam enters the main port of the engine and drives the main piston to the right, when said main piston, through its intermediate mechanism, comes in contact with the adjustable stop. It carries the controlling-valve along with it.

25 When the piston has passed the center of its stroke the controlling-valve closes the port *a'* and opens the port *a*. The steam from the engine-cylinder now passes by the valve under the piston H and closes the cut-off valve. Steam also passes through the small port in the controlling-valve, and thus the valve is balanced. The main piston now completes the stroke by the expansive power of the steam, and as the pressure decreases the speed of the pump decreases also, the pump-valves seat quietly, and the pump in its vacuum end fills with water, and all the shock and jar are thus avoided.

30 When the main piston is near the end of its stroke the main valve is reversed and the steam is exhausted from the cut-off cylinder out with the main exhaust of the engine. The main piston now commences its return-stroke, and the operation just described is repeated.

35 This improved adjustable steam cut-off is a separate instrument, and may be applied to any steam-engine with good results; but it is more particularly adapted to a direct-acting pumping-engine.

40 I am aware that cut-off valves have been operated by steam, and that the main piston

of an engine has been made to open a port near the center of its stroke, through which steam has been supplied to close the cut-off valve; also, pistons and cylinders to actuate cut-off valves have been arranged both inside and outside of a steam-engine. Hence I do not claim broadly any of these inventions.

45 I do not confine myself to any particular construction of the controlling-valve, as it can be made of any known form without changing its operation.

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

1. The cut-off valve D and its cylinder C, the piston H, and cylinder I, connected together by the yoke J, with the openings to connect the instrument with the boiler and steam-engine, substantially as described, and for the purpose specified.

2. The cut-off valve D and its cylinder C, the piston H and cylinder I, connecting-yoke J, and openings to connect the instrument with the boiler and steam-engine, combined with a controlling-valve, L, substantially as described, and for the purpose herein set forth.

3. In combination with a steam cut-off, B, the piston H, and controlling-valve L, the adjustable stops P P', substantially as described, and for the purpose specified.

4. In combination with the controlling-valve L and cylinder K, having the ports *a a'*, connecting it with the said valve, the small port *c*, passing through the controlling-valve, all substantially as and for the purpose specified.

5. In combination with a steam cut-off, B, having a valve, D, piston H, and controlling-valve L, the valves *s s'*, substantially as and for the purpose specified.

6. An adjustable steam cut-off as a separate instrument, adapted to be connected by pipes to a steam-engine and boiler, and having a valve, L, controlling the piston of the cut-off valve, said controlling-valve being operated by the main piston by suitable mechanism, substantially as described, and for the purpose set forth.

7. The cut-off instrument B and pipes A and E, in combination with the pipe T, constructed substantially as shown, for the purpose specified.

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Witnesses:

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