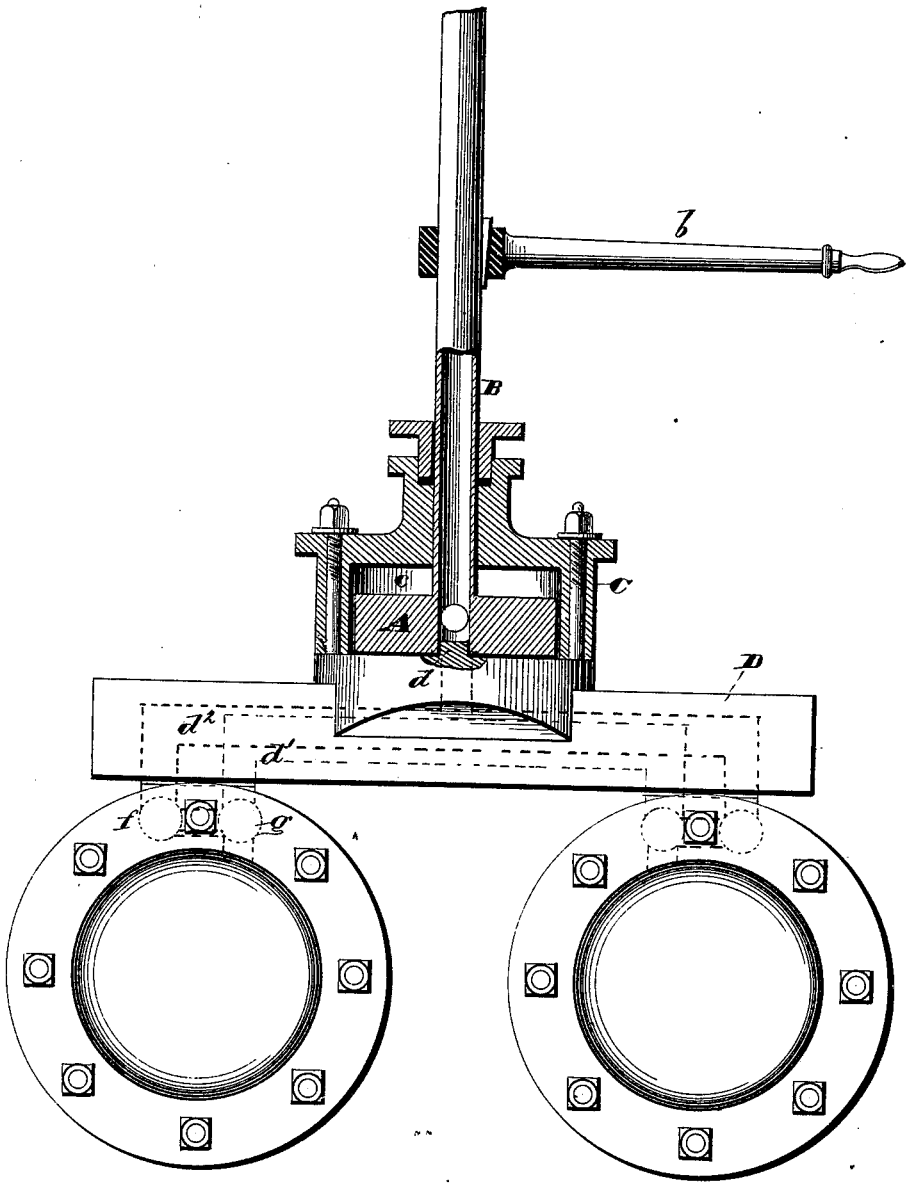
2 Sheets—Sheet 1.

D. JOB.

Rotary-Valve.

No. 197,139. Patented Nov. 13, 1877.

Fig. 1.



WITNESSES

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2 Sheets—Sheet 2.

D. JOB.

Rotary-Valve.

No. 197,139. Patented Nov. 13, 1877.

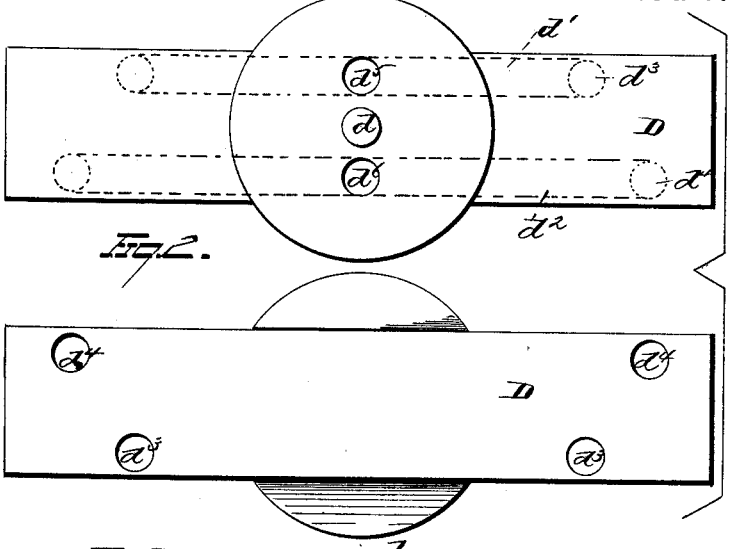

Fig. 2.

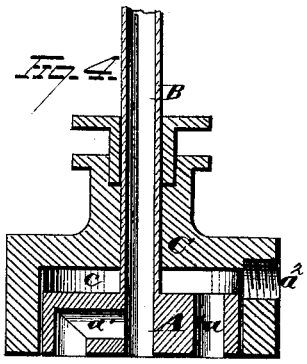

Fig. 4.

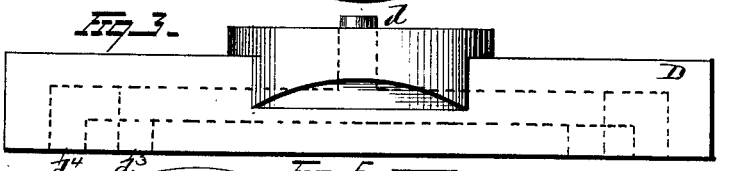

Fig. 3.

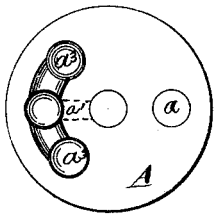

Fig. 5.

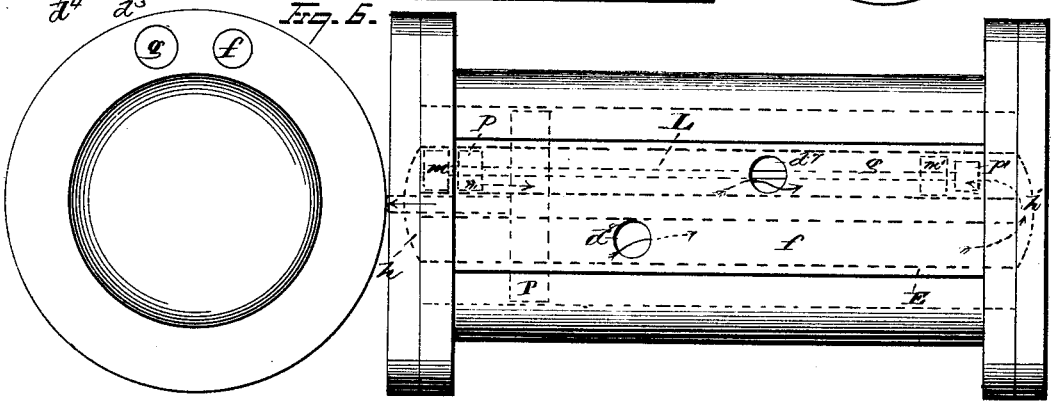

Fig. 6.

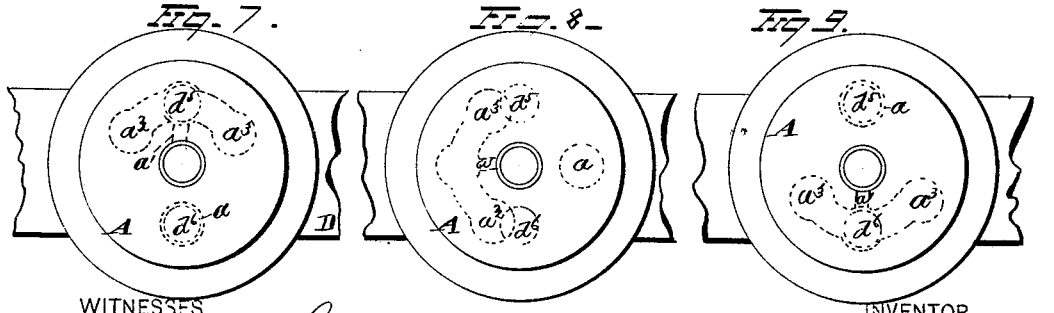

Fig. 7. Fig. 8. Fig. 9.

WITNESSES

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UNITED STATES PATENT OFFICE.

DANIEL JOB, OF NILES, OHIO.

IMPROVEMENT IN ROTARY VALVES.

Specification forming part of Letters Patent No. **197,139**, dated November 13, 1877; application filed September 15, 1877.

To all whom it may concern:

Be it known that I, DANIEL JOB, of Niles, in the county of Trumbull and State of Ohio, have invented certain new and useful Improvements in Steam-Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to steam-engines; and consists in novel mechanism whereby steam is supplied to, and exhausted from, the steam-cylinder, and whereby the direction of motion of the engine can be quickly reversed.

In the drawing, Figure 1 represents a device embodying my invention. Fig. 2 represents a top and bottom view of the conduit-chamber, showing steam passages and openings. Fig. 3 is a side view of the conduit-chamber. Fig. 4 represents a cross-section of the throttle-valve and its casing. Fig. 5 shows a bottom view of the throttle-valve. Fig. 6 represents a top and end view of the steam-cylinder and its slide-valve and steam-passages. Figs. 7, 8, and 9 represent the throttle-valve in three different positions relative to the top openings of the conduit-chamber.

A is the throttle-valve, having a hollow rod or stem, B, firmly attached to it. *b* is a handle secured to said rod or stem, by which the position of the throttle-valve A can be changed.

C is a casing, in which the valve and part of valve-stem are contained. It is firmly attached to the top of the conduit-chamber, over the central part of the same.

The valve A is provided with an opening, *a*, and with a passage, a^1. The former communicates with the inlet-aperture a^2, through which steam enters on its way to operate the pistons, while the latter communicates with the hollow throttle-valve rod B, which serves as a conduit for the exhaust steam.

The valve A is also provided with the depressions a^3, which communicate with the passage a^1, the purpose of which is to allow the steam to escape or exhaust from the piston-cylinders when the supply of steam is entirely cut off.

The valve A fits over a small projection, *d*, of the conduit-chamber, which serves to hold the valve in a central position. A small space, *c*, is left between the top of the valve A and the roof of the surrounding casing, so that the entering steam may always pass through the opening *a*, no matter where said opening may be shifted to when the position of the valve is changed.

D is the conduit-chamber, provided with the steam-passages d^1 and d^2. The passage d^1 communicates, in its central part, with the upper aperture d^5, and at its extremities with the lower apertures d^3. The passage d^2 communicates, in like manner, with the upper aperture d^6 and the lower apertures d^4.

This conduit-chamber D is connected with the steam-cylinders of, preferably, two piston-cylinders by placing the openings d^3 d^4 of chamber D over openings d^7 d^8 of the steam-cylinders, (see Fig. 6,) though it is equally applicable to a single cylinder.

The steam-cylinders E are provided with a steam-passage, *f*, in addition to the passage *g*. The former communicates with opening d^8, the latter with d^7.

The passage *f* communicates at each end with the valve-passage *g* by means of the passages *h h'*, Fig. 6. The slide-valve L, moving in the passage *g*, is provided with two heads, *m m'*, at each end of a connecting-rod. *p* and *p'* are two ports, which connect the passage *g* with the piston-cylinder in which moves the piston P.

The conduit-chamber may be so constructed as to communicate with more than two piston-cylinders, as is evident, and no interference will result.

The operation of the device is as follows: When the throttle-valve A is in the position shown in Fig. 7, the steam that enters through passage a^2 passes through openings *a* and d^6 into the conduit-chamber, from which it passes, by way of d^4 and d^8, into the steam-passage *f*, as indicated by the arrow. When, now, the slide-valve is in the position shown in Fig. 6, the steam that enters through d^8 will take the direction indicated by the arrows, passing from passage *f* to passage *h'* through port p^7 of cylinder *g* into the piston-cylinder, driving the piston in the direction of the arrow. The steam in front of the piston passes from the

piston-cylinder into passage g by way of port p, and then out of passage g by way of opening d^7, into the conduit-chamber through opening d^3. It then passes from the steam-passage d^1, through the upper opening d^5, through the passage a^1 of the throttle-valve, into the hollow stem of the same, from whence it is exhausted.

When, now, it is desired to reverse the engine, the operator takes hold of the handle b and gives the throttle-valve a half-revolution, so that it will be in the position shown in Fig. 9. The course of the entering steam is, in that case, as follows: Through passage a^2, opening a and d^5, passage d^1, opening d^3, and port d^7.

Assuming the steam-piston P to be in the position indicated by Fig. 6, and also moving in the direction shown by the arrow, then the moment the throttle-valve is given the half-revolution referred to, port d^7 ceases to be an exhaust-port, and becomes the steam-port. The steam that enters through it passes into the steam-cylinder through the port p, arrests the motion of the piston, and moves it in the opposite direction, thus reversing the movement of the engine. Steam is now exhausted through port p^1, passage h', passage f, port d^8, opening d^4, passage d^2, upper opening d^6, and passage a^1, to the hollow throttle-valve rod B.

When it is desired to cut off the supply of steam, the operator moves handle b sufficient to give the throttle-valve a quarter-revolution from either of the before-mentioned positions, as indicated in Fig. 8. As neither of the openings in the conduit-chamber is now opposite the opening a of the valve no steam can, of course, enter. The depressions or passages a^3, however, are so placed as to overlap, to a greater or less extent, the openings d^5 and d^6 when the throttle-valve is in the position shown in Fig. 8, so as to allow steam to be exhausted from both ends of the piston-cylinder at the same time.

The slide-valve L is operated by suitable connections with the steam-piston rod or other parts of the engine, in any usual well-known manner.

It is evident from the foregoing description that the engine can be almost instantly reversed, as it takes but an instant to shift the position of the throttle-valve.

It will also be observed that by my invention the throttle-valve serves the four functions of admitting, cutting off, reversing the direction of, and exhausting, the steam.

This device is found to operate very satisfactorily in practice. The engine can be reversed almost instantly; all link mechanism is dispensed with; and the operation of one, two, or any number of engines may be controlled instantly by simply an operation of the throttle-valve alone.

What I claim is—

The combination, with steam-ports d^5 d^6, of the rotary valve, provided with a hollow stem and passages a^3 leading to the exhaust-passage a^1 and steam-passage a, whereby both ends of the cylinder may be open to the exhaust when steam is cut off, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

DANIEL JOB.

Witnesses:
F. TOUMEY,
WM. E. DONNELLY.