

(No Model.)

2 Sheets—Sheet 1.

A. P. BLIVEN.
VALVE FOR STEAM ENGINES.

No. 459,151.

Patented Sept. 8, 1891.

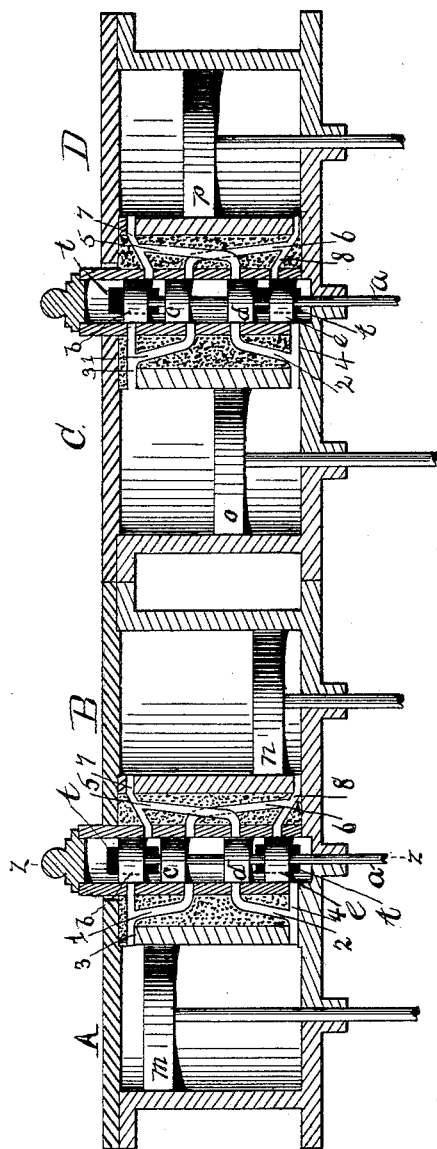


Fig. 1.

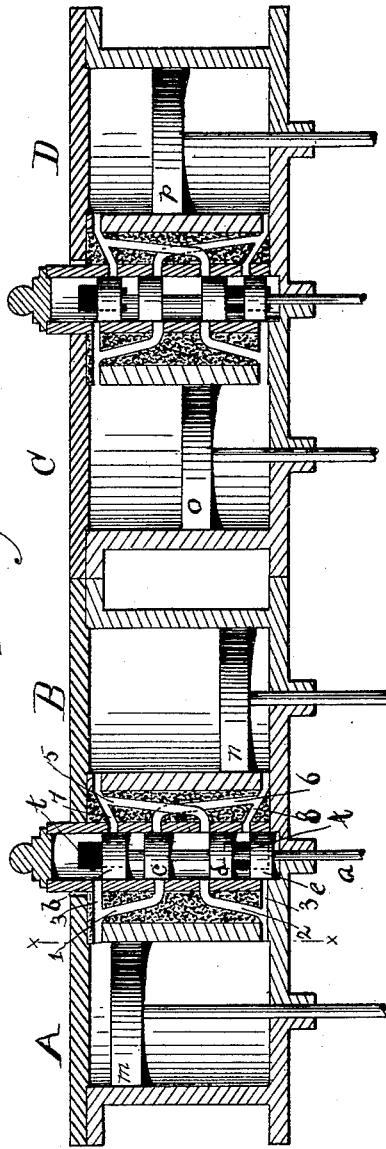


Fig. 2.

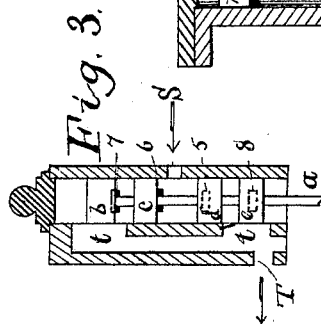


Fig. 3.

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2 Sheets—Sheet 2.

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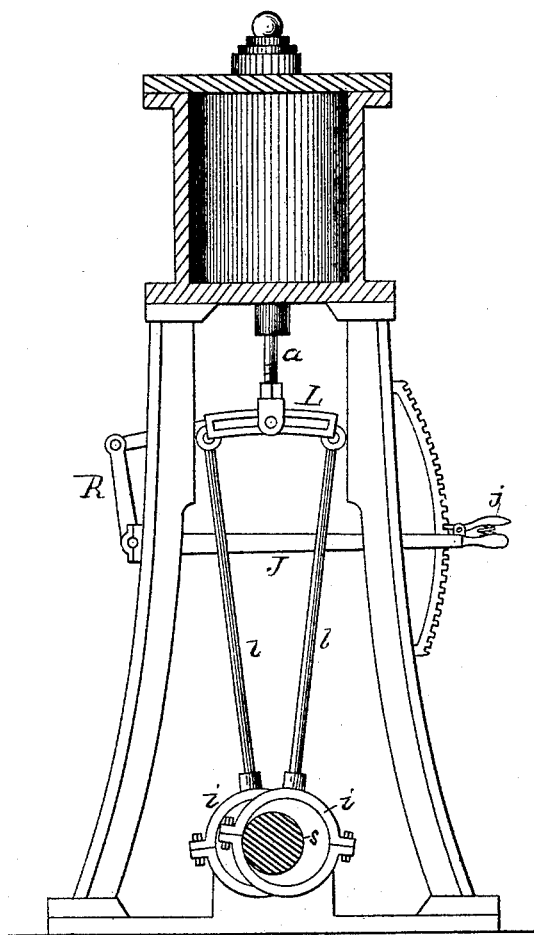


Fig. 4

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UNITED STATES PATENT OFFICE.

ALONZO PERRY BLIVEN, OF BROOKLYN, NEW YORK.

VALVE FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 459,151, dated September 8, 1891.

Application filed January 8, 1891. Serial No. 377,084. (No model.)

To all whom it may concern:

Be it known that I, ALONZO PERRY BLIVEN, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Valves for Steam-Engines, of which the following is a specification.

In the ordinary engine having more than one cylinder it is usually necessary to have a separate valve for regulating the admission and exhausting of the steam for each cylinder, with the accompanying eccentrics and links for reversing and regulating the point of cut-off. These additional parts not only occupy considerable space, but also consume much of the power of the engine to operate them. Moreover, the liability to break down or get out of order is greatly increased, all of which considerations are of considerable importance, especially in engines designed for marine purposes.

The objects of my invention are to produce a single valve of simple construction and easily adjusted, which, with the connecting-passages, will operate two cylinders whose cranks are set at an angle with each other and which requires little power to operate and can be easily reversed. These objects I attain by means of the construction shown in the accompanying drawings, wherein—

Figure 1 shows a sectional view of two pairs of steam-cylinders, each pair operated by a single valve. Fig. 2 is a similar view, but with the valves reversed, the pistons in each case occupying the same positions; and Fig. 3 is a sectional elevation through *z z* in Fig. 1. Fig. 4 is a sectional elevation through *x x* in Fig. 2, showing a simple arrangement of link-motion for operating the valve and for reversing the same.

In Figs. 1 and 2, A and B are two cylinders which are operated by one valve placed between them, and C D is a second pair of cylinders similarly operated by a second valve.

Piston *m* is represented in Fig. 1 as moving downward, piston *n* is on the upstroke, and similarly pistons *o* and *p* are respectively on the down and up stroke. The operation of

the valves is the same in each half of the engine shown, the positions of stroke alone being different.

The valve is of the piston type, and consists of a valve-rod *a*, on which are placed four pistons *b c d e*, of suitable thickness, and at points determined by the width and positions of the ports. In cylinder A, 1 and 2 are the steam-induction passages, and 3 4 are the exhaust-passages, while in cylinder B 5 6 are the induction-passages and 7 8 are its exhaust-passages. In both cylinders the steam-passages join the exhaust-passages just before the latter enter the cylinder, thus necessitating but two ports in each cylinder. The steam-pipe enters the valve-casing between the valve-pistons *c* and *d*, as shown at S in Fig. 3. The pistons *b* and *e* control the exhaust, respectively, at the tops and bottoms of cylinders A and B, and on account of the positions of the exhaust-ports, the two ports 3 7 and 4 8 being placed, respectively, slightly above and below a horizontal line drawn through the center of pistons *b* and *e* when at mid-stroke, each piston exhausts alternately from each cylinder. Thus on the upstroke of the valve ports 4 and 7 are opened, while 3 and 8 are closed, and on the downstroke the reverse operation takes place. The pistons *c* and *d* control the admission of steam to the cylinders A and B, and the steam-ports 1 5 and 2 6 are placed, respectively, opposite each other in the valve-casing; but in order to produce opposite motions in the cylinder-pistons *m* and *n* the passage 5 is carried to the bottom of B, while the corresponding passage 1 leads directly to the upper end of A. In the same way passage 2 leads directly to the lower end of A, while 6 leads to the upper end of B, 5 and 6 winding around each other within the body of the valve-casing. The exhaust escapes from the valve-casing through ports *t t*, which terminate in the outer opening T, communicating with the air or a condenser. It will be seen that as all condensation, either in the cylinders or in the valve-casing, has a free escape from the ports *t t* no petcocks are necessary on the cylinders or valve-case.

In order to produce a perfectly-balanced

engine with no dead-points, I combine four cylinders, as shown, working on one shaft, which has its cranks set at right angles; but as the operation of one valve with its two cylinders fully illustrates my invention I here only describe the operation of half of the engine illustrated.

In operation, as shown in Fig. 1, the valve is at its upper position and the stroke is just commencing in each cylinder, but with the two pistons *m n* moving in opposite directions. Piston *b* of the valve has closed the exhaust-passage 3 and opened 7. Piston *c* has opened both of the steam-ports 1 and 5. Piston *d* has closed the two steam-passages 2 and 6, while piston *e* has closed exhaust-port 8 and opened 4. The same operations are taking place in the cylinders C and D of the other half of the engine, but at a different point of the stroke.

In Fig. 2 the valves are shown as reversed to drive the engine in the opposite direction, but with pistons in same positions as in Fig. 1, and this reversing may be effected in any of the usual ways.

I have shown in Fig. 4 a simple method of effecting the reversing of the engine, and here *s* is the crank-shaft; *i i*, eccentrics set on S opposite to each other; *l l*, eccentric-rods; *L*, link. R is a rocker-arm connected with the link and operated by the lever J, which is secured in any desired position by the latch *j*. It is evident that raising the lever J will throw the link to the back of the engine to run it backward and lowering J will throw the link to the front to run forward. I do not, however, confine myself to this particular construction.

A piston-valve of the description here shown can be easily turned up in a lathe with great precision, and requires no further scraping or fitting. The valve-case also is of simple construction, it being made of a cast-liner which is first bored out and turned up true, and the ports are then cut with perfect accuracy by a milling-machine.

Another advantage of the above-described valve is that it is perfectly balanced, the steam acting equally in either direction on pistons *c* and *d*, while the atmosphere or air-pump, if

it is a condensing-engine, acts in opposite directions on either end of the valve.

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

1. In a steam-engine, the combination of two steam-cylinders with a valve consisting of four cylindrical pistons set upon a single valve-rod, the upper of said pistons coacting with suitable passages by its reciprocating motion permitting the steam to exhaust from the upper ends of said cylinders alternately, the second of said pistons alternately opening and closing ports admitting steam to the top of the first cylinder and to the bottom of the second cylinder, the third and fourth pistons performing, respectively, the reverse operations of the second and first pistons, substantially as and for the purpose set forth.

2. In a steam-engine, the cylinders A and B and the valve composed of the four pistons *b c d e*, set on the rod *a* and receiving a reciprocating motion by any suitable means, in combination with the exhaust-passages 3 8 and 4 7, which are alternately opened and closed in pairs by the pistons *b* and *e*, and the steam-passages 1 6 and 2 5, which are alternately opened and closed in pairs by the pistons *c* and *d*, respectively, the passages 1 and 2 leading, respectively, to the top and bottom of cylinder A, while 6 5 are led to the bottom and top of cylinder B, respectively, in order to impart to piston *n* the opposite movement to that of piston *m*, substantially as described.

3. In a steam-engine, a piston-valve consisting of four pistons *b c d e*, attached to the valve-rod *a* and operating two cylinders whose pistons move in opposite directions, in combination with the passages 3 8 and 4 7, which alternately opening in pairs exhaust from the opposite ends of the cylinders A and B through the passages *t t*, and the steam-passages 1 6 and 2 5, which opening in pairs alternately admit steam to the opposite ends of said cylinders, substantially as and for the purpose set forth.

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Witnesses:

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