

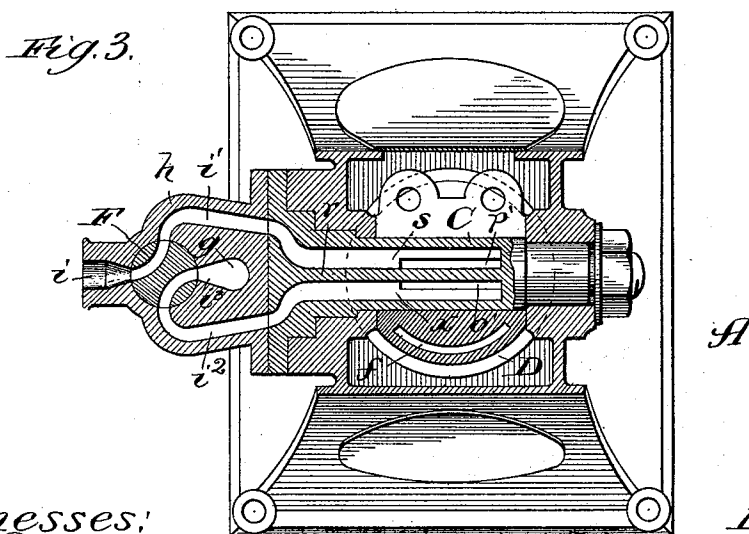
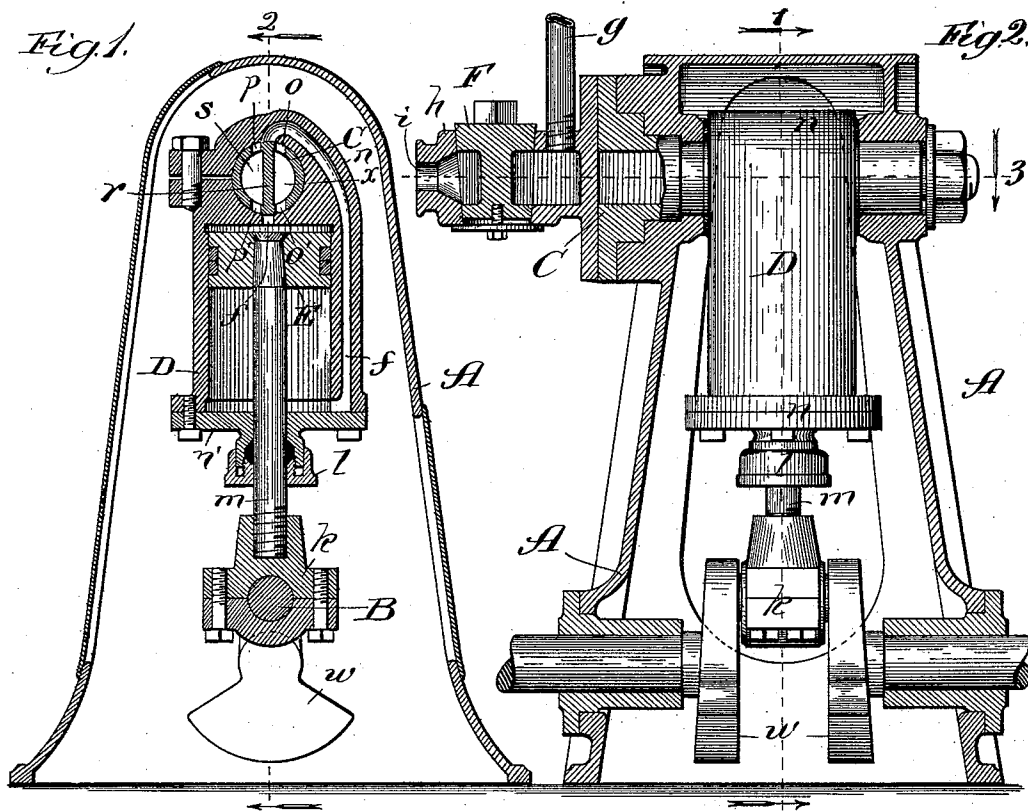
(No Model.)

2 Sheets—Sheet 1.

W. THOMAS.
OSCILLATING STEAM ENGINE.

No. 464,206.

Patented Dec. 1. 1891.



Witnesses:

Charles C. Gaylord,
Clifford H. White.

Inventor:

William Thomas,
By Dymally & Dymally,
Attorneys.

(No Model.)

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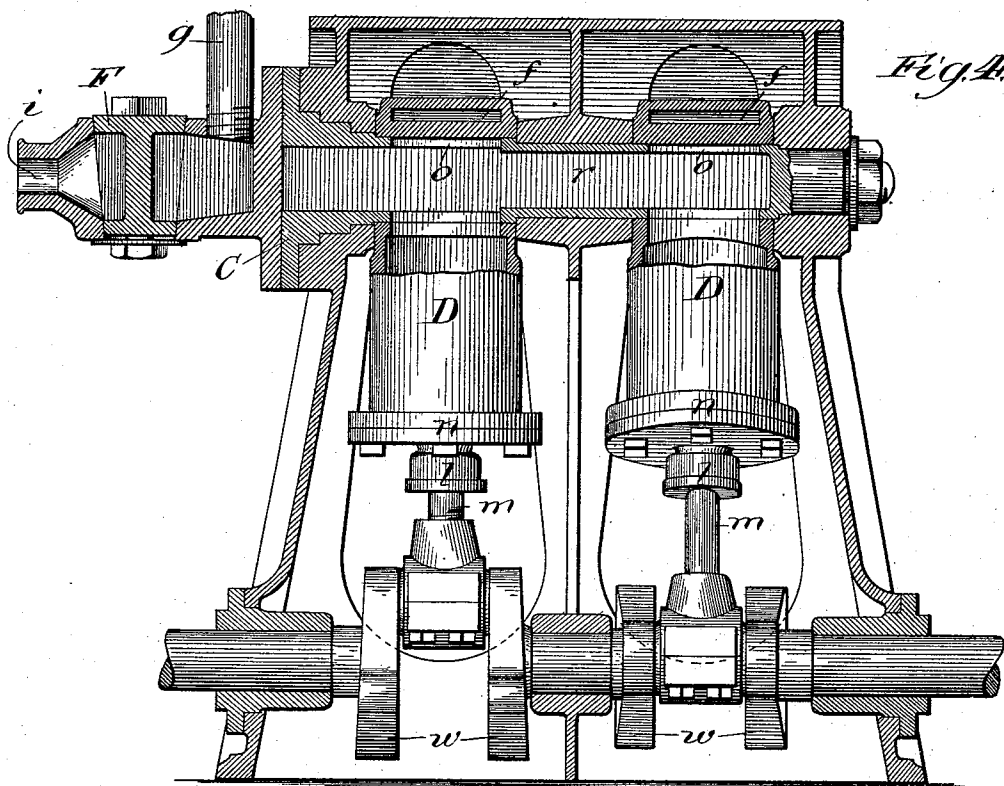


Fig. 4.

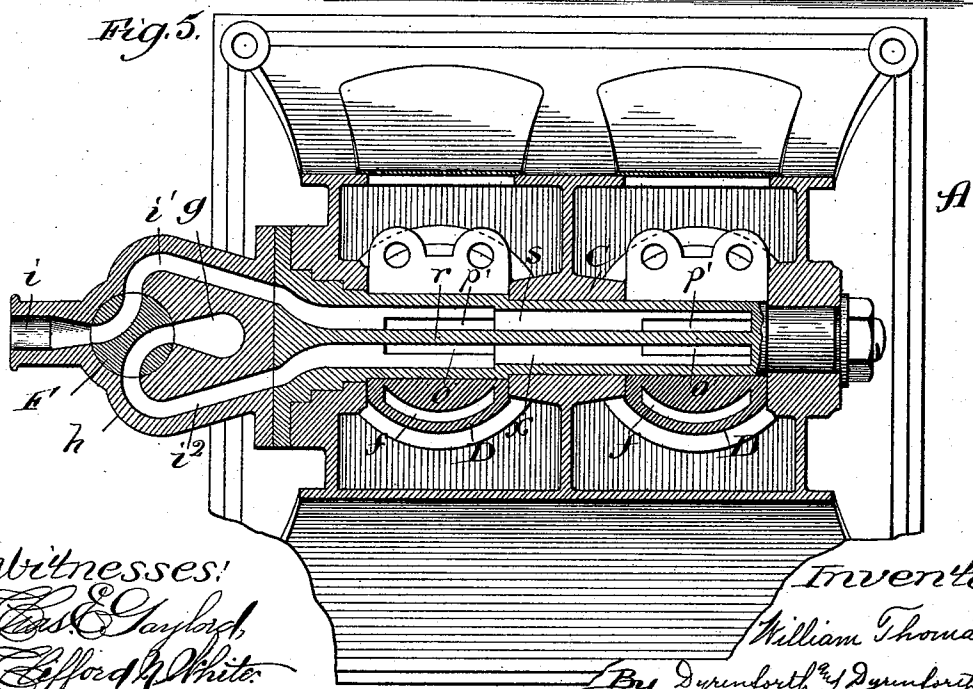


Fig. 5.

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UNITED STATES PATENT OFFICE.

WILLIAM THOMAS, OF ORINGTON, ILLINOIS.

OSCILLATING STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 464,206, dated December 1, 1891.

Application filed April 7, 1891. Serial No. 387,935. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM THOMAS, a citizen of the United States, residing at Orington, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Oscillating Steam-Engines, of which the following is a specification.

The object of my invention is to provide a construction of oscillating steam-engine resembling that set forth in Reissued Letters Patent of the United States No. 4,882, granted to Welch and Welch April 23, 1872, but whereby it shall be readily responsive to reversal of its motion at any point of the piston-stroke without danger from or injury to it, and which shall be adaptable for advantageous use for all the various purposes of steam-engines, whether stationary or locomotive, though I more particularly design it for the stationary class, including elevator, hoisting, mining, and marine engines.

In the accompanying drawings, Figure 1 is a sectional view, taken on the line 1 1 of Fig. 2 and regarded in the direction indicated by the arrows, of the single form of my improved oscillating reversible valveless steam-engine. Fig. 2 is a similar view of the same, the section being taken at the line 2 2 on Fig. 1 and regarded in the direction indicated by the arrows, with the cylinder represented in elevation. Fig. 3 is a sectional plan view of the same, taken on the line 3 3 of Fig. 2 and regarded in the direction indicated by the arrows. Figs. 4 and 5 are views, respectively, like those presented in Figs. 2 and 3, but illustrating my improvement as a duplex reversible valveless steam-engine.

The principle involved in this engine is that of having the steam-cylinder or any desired number of such cylinders, each provided with two steam-passages leading, respectively, to opposite sides of the piston, connected at its piston-rod with a crank on the shaft to be driven and suspended to oscillate on a stationary hollow pin, forming the steam-chest, divided by a diaphragm longitudinally into two chambers, each provided with two ports, caused by the oscillations of the cylinder to coincide simultaneously in pairs with the said steam-passages, whereby the steam enters each cylinder alternately against and exhausts

alternately from opposite sides of the piston from ports caused to open into the cylinder by its oscillating movements.

A, Figs. 1 to 3, is the supporting-frame, having journaled in suitable bearings near its base a crank-shaft B. In the upper portion of the frame, extending parallel with the crank-shaft, is a rigid hollow pin C, divided longitudinally by a diaphragm *r* into two chambers *s* and *x*, either of which affords the steam-chamber, while the other is for the exhaust, and at the opposite upper sides of the diaphragm are the ports *p* and *o*, while at its opposite lower sides are the ports *p'* and *o'*.

D is a steam-cylinder having a thick upper head *n*, provided with a cylindrical transverse opening in which the pin C fits snugly.

E is the piston, the rod *m* of which passes through the cylinder-head *n'*, (where a suitable stuffing-box *l* is provided, as indicated,) and is connected by a yoke *k* with the crank on the shaft B, the crank also carrying a counter-weight *w* for the cylinder.

At one end of the hollow pin C (the opposite end being closed) is a head *h*, having at its outer extremity a steam-supply passage *i*, from near which extend branch passages *i'* and *i''*, respectively, into the chambers *s* and *x*, and *g* is the exhaust-pipe leading transversely from near the center of the head *h*, where a short passage *i'''* branches from it into a chamber containing a four-way throttle F. A steam-duct *f* leads from the cylindrical opening in the cylinder-head *n*, housing the hollow pin C, and from a point above the diaphragm *r* down through the wall of the cylinder D into the latter below the limit of the downstroke of the piston E. A vertically-short duct *f'* extends from below the pin C into the cylinder D above the piston therein.

The operation is as follows: With the four-way throttle F turned to the position most clearly represented in Fig. 3, steam is entering the steam-chest chamber *s*, the duct *f'* then eventually (when the crank is moved beyond the center) coinciding with the port *p'*, the ports *p* and *o'* being closed by the head *n*, and the passage *f* coinciding with the port *o* when the duct *f'* coincides with the port *p'*. Then the steam from the chamber *s* will enter the cylinder D against the upper side of the piston

therein, driving the shaft B, and the downward stroke of the piston will force any steam previously admitted behind it out of the cylinder through the passage f into the exhaust-chamber x , whence it will escape through the passage i^2 and throttle F out of the pipe g . The movement thus described throws the crank-shaft half-way around beyond a dead-center, and the completion of its throw oscillates the cylinder D back, bringing the duct f' to the port o' , leading into the exhaust-chamber x , the port p leading from the steam-chamber to the passage f and effecting closure of the ports o and p' , whereby the steam enters below the piston and that above it is exhausted. Thus the oscillations of the cylinder D continue and rotate the crank-shaft.

Obviously to reverse the direction of rotation of the crank-shaft at either end of the stroke of the piston or at any intermediate point between the ends of its stroke it is only necessary to turn the throttle F to lead the steam into the passage i^2 and produce communication of the passage i' with the exhaust-pipe g , and that such reversal at any point of the stroke may be produced instantaneously, smoothly, and without injury to the engine or danger from it is manifest.

The construction illustrated in Figs. 4 and 5 merely represents a duplication of the engine, which, from the foregoing explanation relating to its single form, will be readily understood without detailed explanation, as will also further multiplication of the cranks, cylinders, and other parts of which my improvement will submit, to those skilled in the art to which my invention relates. Suffice it, therefore, to say that the one four-way throttle F, one hollow pin C, one exhaust g , and one shaft B are all that is necessary, while the number of cylinders D, cranks on the shaft, and other details are multiplied in accordance with the number of such cylinders provided.

My improved engine is powerful and rapid in its operation, because it takes steam and exhausts from both ends, and its simplicity, durability, and reliability referred to will be quite apparent from the foregoing explanation of its construction and manner of operation.

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

An oscillating steam-engine comprising, in combination with a frame and crank-shaft, a hollow pin C, stationarily supported in the frame and containing a diaphragm r , dividing it into two chambers s and x , a port p and a port p' in the pin at one side of the diaphragm for the chamber s , a port o and a port o' in the pin at the opposite side of the diaphragm for the chamber x , a steam-cylinder D, supported to oscillate on the pin and having its piston-rod connected with the crank-shaft, two ducts f and f' for the four ports in the hollow pin, the former leading at one end into the cylinder below the piston and coinciding at its opposite end in the oscillations of the cylinder alternately with the ports p and o , the latter leading at one end into the cylinder above the piston and coinciding at its opposite end in the oscillations of the cylinder alternately with the ports o' and p' , a head h at one end of the pin, forming an extension lengthwise thereof, having a steam-supply passage i and branches i' and i^2 leading, respectively, toward the chambers s and x and an exhaust g , and a four-way rotary throttle F in the head between the passage i and branches thereof, the whole being constructed and arranged to operate substantially as described.

WILLIAM THOMAS.

In presence of—

J. W. DYRENTFORTH,
M. J. FROST.