

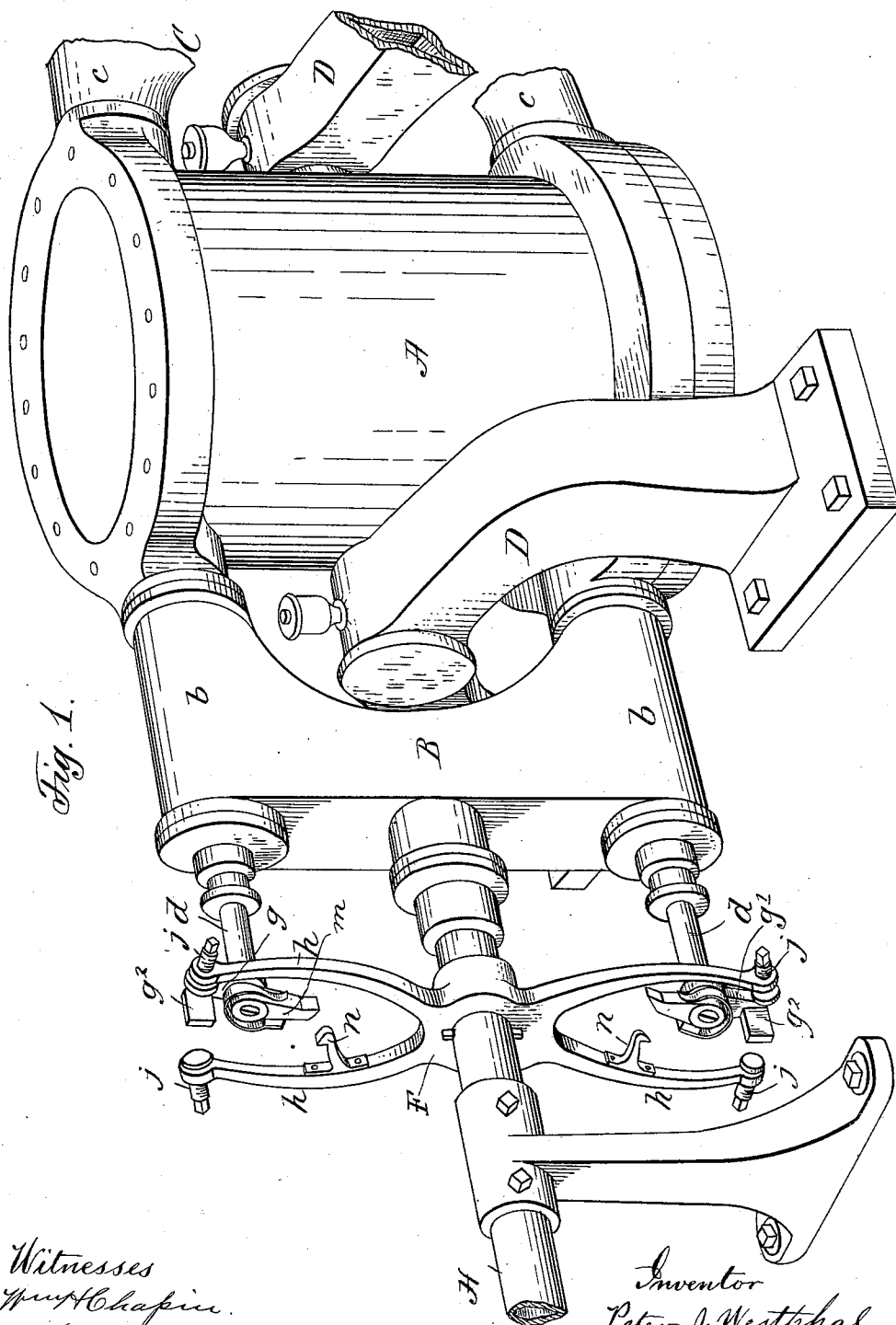
(No Model.)

3 Sheets—Sheet 1.

P. J. WESTPHAL.
MECHANISM FOR OSCILLATING ENGINES.

No. 540,886.

Patented June 11, 1895.



Witnesses
Wm. H. Chapin.
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Inventor
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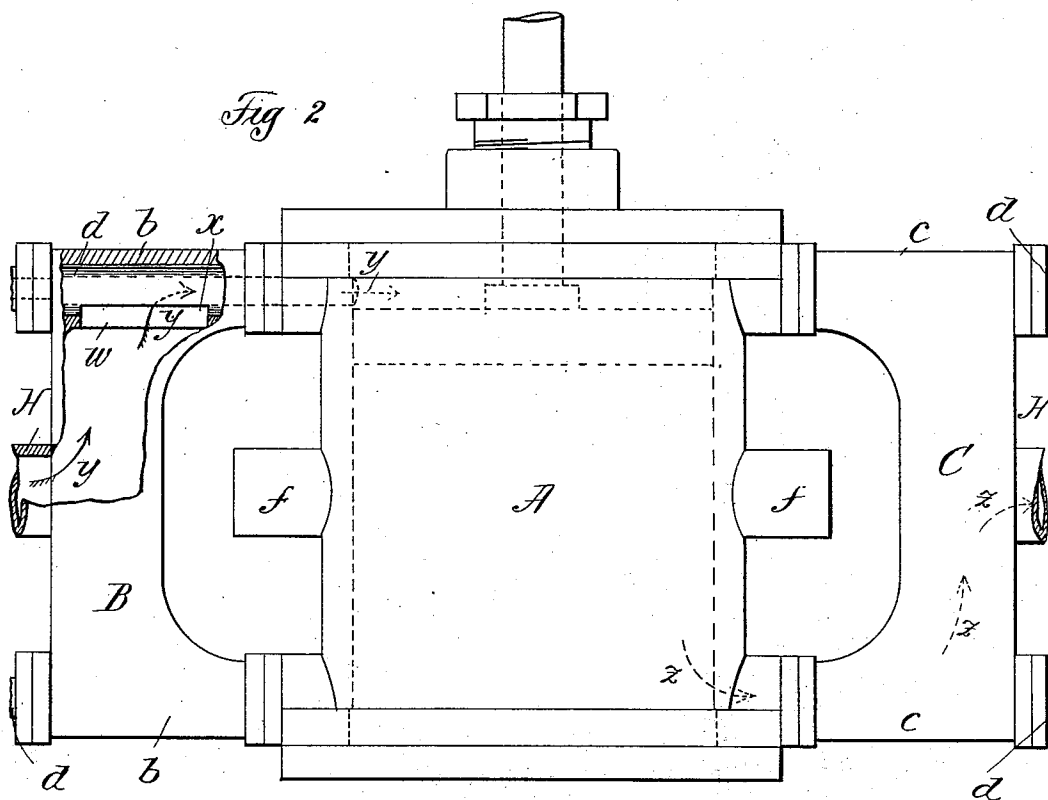
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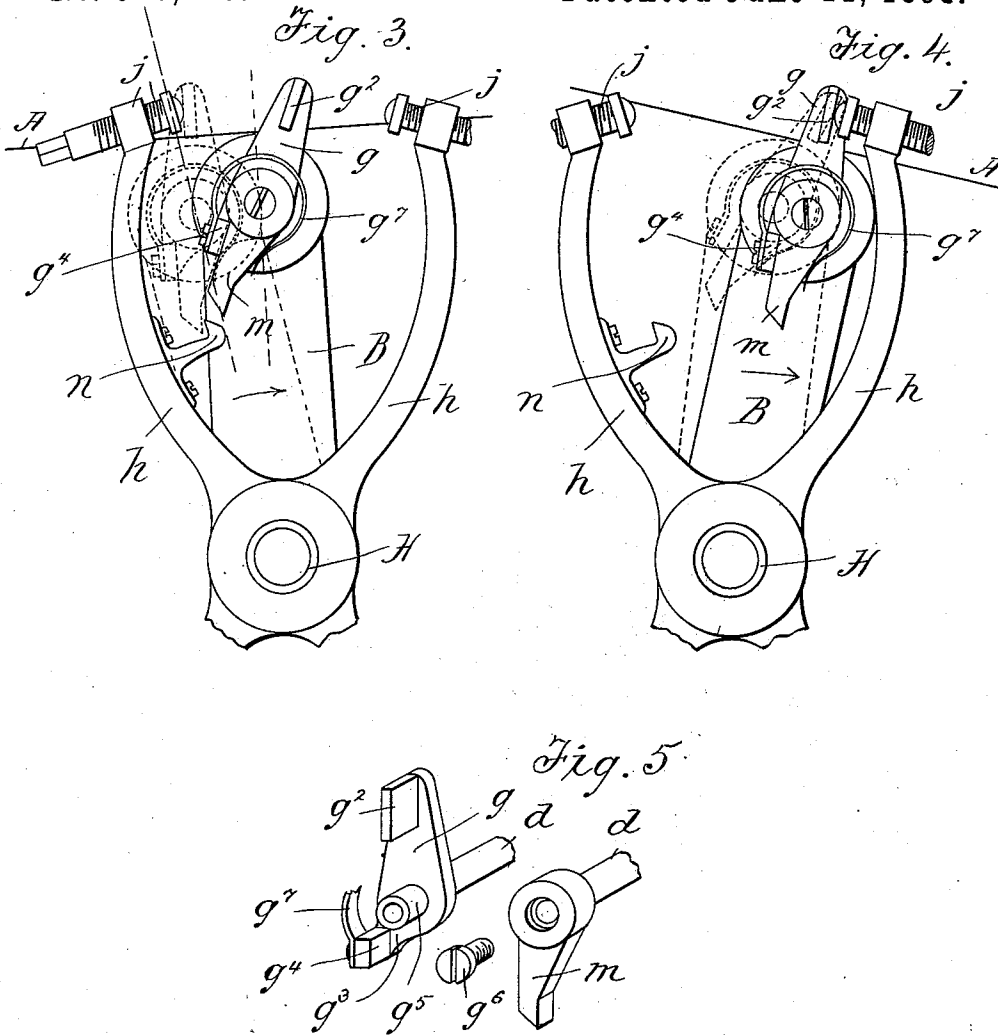
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UNITED STATES PATENT OFFICE.

PETER J. WESTPHAL, OF HOLYOKE, MASSACHUSETTS.

MECHANISM FOR OSCILLATING ENGINES.

SPECIFICATION forming part of Letters Patent No. 540,886, dated June 11, 1895.

Application filed October 4, 1894. Serial No. 524,906. (No model.)

To all whom it may concern:

Be it known that I, PETER J. WESTPHAL, a citizen of the United States, residing at Holyoke, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Valve Mechanism for Oscillating Engines, of which the following is a specification.

This invention relates to valve operating mechanism for oscillating engines, the object being to assure the employment of a valve mechanism and operating devices therefor which shall be of very simple construction, but which shall furthermore be most readily and easily susceptible of change or adjustment to vary the periodicity of the pressure, and the extent and relation as to time of the lead and cut-off.

The invention consists in constructions and combinations of parts, all substantially as will hereinafter fully appear and be set forth in the claims.

Reference is to be had to the accompanying drawings, in which—

Figure 1 is a perspective view showing the oscillating cylinder, the pressure steam-chest and the pressure steam-pipe, and the operating mechanism for the steam-pressure valves. Fig. 2 is a side elevation of the cylinder with the pressure and exhaust chests therefor, a part of the former being broken away to show one of the rocking valves of which in this engine there are understood to be four—two pressure and two exhaust—and located in opposition at the corners of the cylinder at which are connected the steam-chests. Figs. 3 and 4 are views in partial end elevation illustrating the valve-operating mechanism, and which will be hereinafter particularly referred to. Fig. 5 is a perspective view to show details of construction hereinafter specified.

In the drawings, A represents the cylinder having at the opposite sides thereof the U-formed steam chests, B and C, one for pressure and the other for exhaust. The hollow limbs, *b, b*, and *c, c*, of each steam chest communicate with the upper and lower ends of the cylinder. In each of said limbs, *b* and *c*, of the steam chests are passages to constitute sockets for the rock-shafts, *d, d*, which also have passages through their inner end por-

tions for communication with the cylinder chamber; and each of said passages, in the valve-shafts, has a port, *x*, as common in this class of valves, to register with the adjacent port, *w*, in the steam chest. See upper left-hand portion of Fig. 2. The cylinder is mounted for oscillation by having its trunnions, *f, f*, supported in the angular uprights, D, D, the extremities of which are accommodated within the space between the steam chests and the sides of the cylinder. The steam pressure and exhaust pipes, H, H, are shown as connecting the middles of the steam chests, B, C, their arrangement being axially coincident with the trunnion-supports of the cylinder.

The rocking valve-shafts, *d*, of which there are four, which are horizontal and parallel with the axis of oscillation of the cylinder, have at their extremities cranked arms, *g*,—Fig. 1,—each with an abutment member, *g*², at its extremity.

Of course, as the cylinder has its oscillating movement, the valve-shafts, *d*, and their arms, *g*, have, bodily, swinging movements through an arc course, the arms, (or the abutment members, *g*², thereof) working between the separated arms, *h, h*, of the spider frame, F, which is immovably supported, as by being fitted on the steam-pipe, H. The said separated arms, *h*, of the spider-frame have the screws, *j*, through them which constitute adjustable abutments for the contact of the offset members, *g*², of the rock-shaft arms.

Each of the arms, *g*, has, as an extension thereof, in the direction of its length, which is at right angles beyond the axis of the rocking valve-shaft, *d*, an articulated auxiliary arm, or pawl, *m*, which is so jointed relative to the arm, *g*, that when said arm, *g*, comes to contact against the one of the abutments, *j*, which gives to the valve its slight opening for "lead," the said auxiliary arm, *m*, will snap past the stationary hook, *n*, supported on one of the spider arms, and into engagement therewith, so that in consequence of the lead then given, and as the cylinder receives the initial portion of its reverse swing, the hook will by tripping the auxiliary arm, *m*, and with it, as well, the valve-shaft and arm, *g*, cause the full opening of the valve for the

piston stroke which will continue until the valve last opened is closed, which occurs in consequence of the arm, g , by its abutment, g^2 , striking against the screw, j , horizontally opposite to the one on which it had contacted in getting the "lead." The other pressure valve shaft, d , which moves in unison with the oscillating cylinder and which had been in its closed position at the end of the one stroke, has its members, g, g^2 , contact against one of the abutments, j , at the vertically opposite part of the spider, for the lead for the reversed stroke, its auxiliary arm taking the engagement with the hook, n , which action is quickly followed by the valv shaft being further rocked to fully open for the continuance of such reversed stroke.

On reference to Fig. 3 of the drawings, it will be understood that the dotted lines represent the arm, g, g^2 , as slightly swung, as occurs at the end of an oscillation of the cylinder to correspondingly slightly rock the valve-shaft to give the lead for the new stroke, and also will be seen in dotted lines the engagement which the arm, m , has assumed with the stationary hook, n .

The movable parts which in Fig. 3 are represented by full lines it will be understood are in those positions which they assume upon fairly moving on the full stroke, the pawl-arm, m , having been, by its engagement with the hook, swung to throw the valve wide open before being permitted to pass clear from the hook.

Fig. 4 illustrates the changes which take place at the completion of the stroke occasioned by the opening of the valve shaft, of which there are comprised parts, g, m , are adjuncts. Here is seen, in dotted lines, the position of the fixed arm, g , of the valve-shaft at just the instant preceding the end of the piston stroke, and in full lines the position at the very end of the stroke whereupon the valve is fully closed.

The details of construction for the articulation of the pawl-arm, m , on, or relative to, the arm, g , whereby it may trip past the hook at the one time and remain immovable relative to the arm, g , at another time, to insure the rocking of the valve, as shown in Fig. 5.

The rigid arm, g , of the valve-shaft has the depending portion, g^3 , with the abutment lug, g^4 , and the pawl-arm, m , is pivotally mounted to swing on the part, g , by having its bored hub set over the boss, g^5 , and retained by the screw, g^6 . The edge of the arm, m , normally rests against the lug, g^4 , being retained thereby by the spring, g^7 . This is a common form of tripping pawl, capable of receding against pressure at one side, but remaining rigid relative to the exertion of any pressure at the other side, and comprises no novelty in itself, and may be of widely varied design. It, however, enters as an important factor as contributing in the operativeness of the mechanism, as a whole. Plainly, by changing the

positions of the screws, the periodicity of the valve-opening and the extent of lead and cut-off may be varied, as desired, so as to adapt the engine for its most efficient operation, so far as the same may be affected by the valve mechanism.

The operating devices for the exhaust valve rock-shafts of the oscillating engine may consist of the spider, as seen in Fig. 1, with the screw abutments, j, j , to coact with the said valve rock-shafts which have merely the cranked arms, as g , with members or portions to contact against said abutments.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In an oscillating engine, the combination with the oscillatory cylinder having the steam passages leading thereinto at its upper and lower ends and having the rocking valve shafts thereat, each with a cranked arm, of paired and separated abutment members between and against which the cranked rock-shaft members move as the cylinder oscillates, substantially as and for the purposes set forth.

2. In an oscillating engine, the combination with the oscillatory cylinder having the steam passages leading thereinto at its upper and lower ends and having the rocking valve shafts thereat, each with a cranked arm, of paired and separated abutment members having the separated adjustable abutment screws, j, j , between and against which the extremities of the cranked rock-shaft members move as the cylinder oscillates, substantially as described.

3. In an oscillating engine, in combination, the oscillatory cylinder having at its opposite sides the steam chests, B and C, each with the inturned limbs, b, b , and c, c , having valve sockets therein which communicate with the ends of the cylinder chamber, the fixed steam-pipes, H, H, connected with the steam chests and arranged in the axis of oscillation of the cylinder, the rock-shaft valves mounted in said valve sockets and having at their ends each a cranked arm, and the spiders, F, supported on the steam pipes and having the double pairs of arms, h, h , provided with the adjustable screw abutments, j, j , between and against which the valve-shaft arms move, as the cylinder oscillates, all substantially as described.

4. In an oscillating engine, the combination with the oscillatory cylinder having the steam passages leading thereto at its upper and lower ends, and having the rocking valve shafts thereat each with a cranked arm, and each provided with a pawl arm, which is adapted to yield only against force in one direction, substantially as described, of paired and separated abutment members between and against which the cranked rock-shaft members move as the cylinder oscillates, and a stationary part into engagement with which

each of said pawl arms will periodically move, substantially as and for the purposes described.

5 In an oscillating engine, the combination with the separated paired stationary arms, *h*, *h*, each with the adjustable abutments, *j*, and one of each being provided with the hook, *n*, of the oscillatory cylinder having the valve

rock shaft each with an arm, *g*, and an auxiliary pawl-arm, *m*, to cooperate with the hook, *n*, substantially as and for the purposes set forth.

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