2 Sheets—Sheet 1.

W. S. WILKINSON.

Oscillating-Engines.

No. 219,331. Patented Sept. 2, 1879.

Fig. 1.

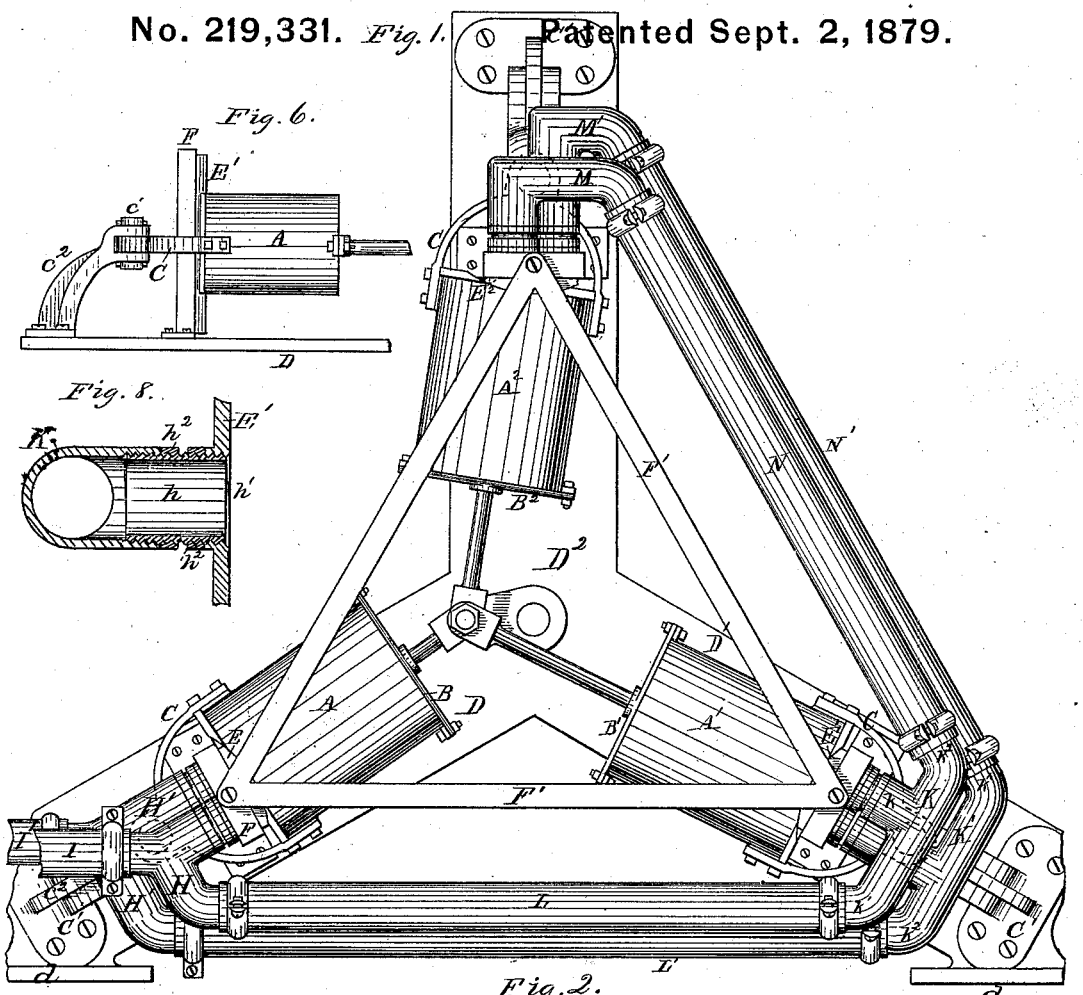


Fig. 6.

Fig. 8.

Fig. 2.

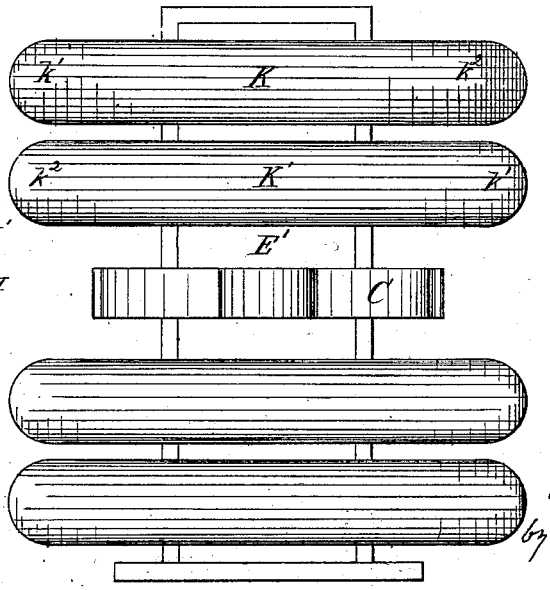
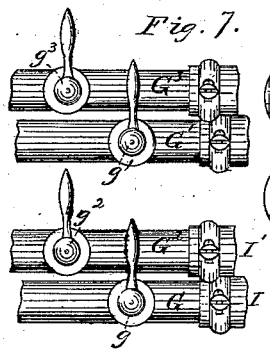


Fig. 7.



Witnesses:

N. N. Low.

J. S. Barker

Inventor:

W. S. Wilkinson

by W. W. Doubleday

Atty

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Fig. 5.

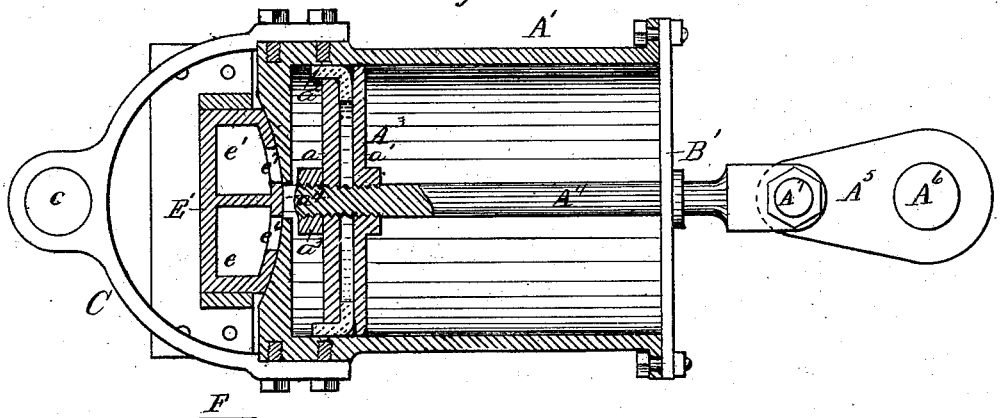


Fig. 4.

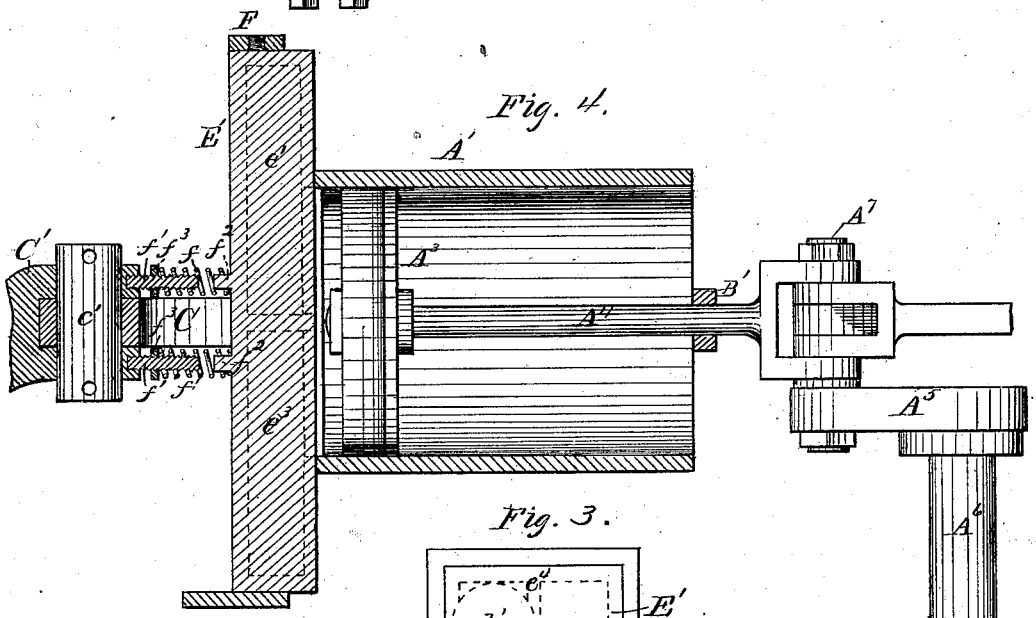
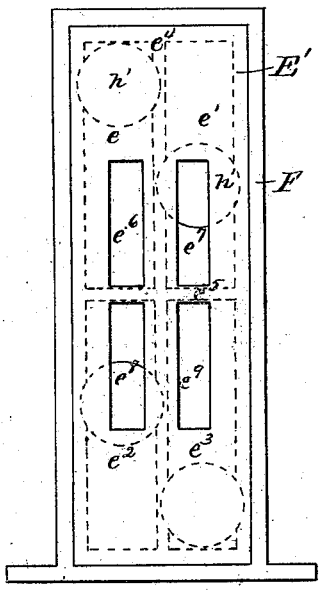


Fig. 3.



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N. N. Low
J. S. Barker.

Inventor:
W. S. Wilkinson
by W. H. Doubleday
atty

UNITED STATES PATENT OFFICE.

WALTER S. WILKINSON, OF BALTIMORE, MARYLAND.

IMPROVEMENT IN OSCILLATING ENGINES.

Specification forming part of Letters Patent No. **219,331**, dated September 2, 1879; application filed July 10, 1879.

To all whom it may concern:

Be it known that I, WALTER S. WILKINSON, of Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Oscillating Engines; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Figure 1 is a side elevation of my improved engine. Fig. 2 is a rear elevation of one of the water or steam chests detached. Fig. 3 is a front elevation of a chest detached. Fig. 4 is a longitudinal section of one of the cylinders and its chest. Fig. 5 is a longitudinal section, taken at right angles to the section shown in Fig. 4. Fig. 6 is a side elevation of a cylinder and its supporting devices. Fig. 7 is a plan view of the feed and exhaust pipes, and Fig. 8 is a transverse section of one of the elbows.

In the drawings, A A^1 A^2 represent the cylinders of the engine. They are arranged to oscillate upon trunnions or pivots situated to the rear of the cylinders. Each cylinder is provided with a piston-head, A^3, and a rod, A^4, attached to the crank A^5 on the shaft A^6 by means of a crank-pin, A^7, to which the piston-rods are pivoted, as shown in Fig. 4, in such manner that the cylinders can oscillate in the same plane and be made to bear evenly upon the shafts.

B B^1 B^2 represent guide-plates arranged across the front ends of the cylinders, through which the piston-rods A^4 respectively pass, and which serve to guide said rods and retain them in proper position. The pistons are formed of the plates *a* a^1 and the packing a^2, held together upon the rod A^4 by the nut a^3.

a^4 represents the port into the cylinder. It is situated at the center of the rear end of the cylinder, and in length is substantially equal to the diameter of the same.

The cylinders are supported by means of yokes C C C, which, at their ends, are rigidly secured to the cylinders, as shown in Fig. 5. At their centers they are provided with eyes *c c c*, whereby the cylinders are mounted in standards C′ C′ C′ upon pivots c^1.

I prefer to mount the engine in the manner shown in Fig. 1—that is to say, so that the cylinders shall oscillate in a vertical plane and rotate a horizontal shaft.

A supporting-frame is formed of the plate or plates D D^1 D^2, all of which can be cast in one piece, and can be secured to the floor by means of the bottom plates *d d*.

The standards C′ C′ C′, to which the cylinders are respectively pivoted, are bolted to the plate D D^1 D^2, as shown in Fig. 1. Said standards are constructed with re-enforcing or strengthening ribs, as shown at c^2 c^2 c^2.

E E^1 E^2 represent the water or steam chests, respectively combined with the cylinders A A^1 A^2. In an engine adapted to move in but one direction these chests are provided with one supply-chamber, *e*, and one exhaust-chamber, e^1. In engines adapted to reverse their motion there are two supply and two exhaust chambers, as shown at *e* e^2, e^1 e^3. Each of these chests is supported loosely in a frame, F, which is rigidly bolted to the vertical supporting-frame D D^1 D^2, as shown in Figs. 4 and 5.

The cylinders of the engine are so constructed and mounted that while oscillating they remain in perfect bearing against the chests E.

The chest E is constructed with a convex front surface, the curve being described radially from the line about which the cylinder oscillates.

The rear end of the cylinder is provided with a curved recess corresponding to the surface of the chest.

The chambers *e* e^1 e^2 e^3 are formed by a vertical diaphragm, e^4, and a horizontal diaphragm, e^5, passing centrally through the chest E. (See Fig. 3, dotted lines.)

The supply-ports are represented by e^6 e^8, and the exhaust-ports by e^7 e^9. I prefer to make these ports so that they shall be longer on the line perpendicular to the plane of their rotation than upon the line parallel to the plane of their rotation, for in this way there can be provided a larger passage-way for the water without necessitating a longer time to open or close the ports.

It will be seen that if the chest E be stationary and the cylinder be oscillated, it (the cylinder) will carry its port a^4 alternately from the supply-port to the exhaust-port in the chest.

It will be understood by those acquainted with the construction and operation of water-motors that by making the port a^4 and the ports e^6 e^7 e^8 e^9 as large as possible and practicable, and arranging them so that they shall be quickly closed at the top of the stroke and quickly opened at the bottom of the stroke, (at which points the piston moves most slowly,) I overcome many of the difficulties incident to water-motors; and, moreover, that by the combination of three cylinders substantially of the construction and in the manner shown there is no power lost in overcoming the reaction or ram in the pipes, because there can be no checking or stopping of the column of water while the engine is moving.

The chest E is supported upon the frame F loosely, so that it can be arranged to always bear closely against the cylinder regardless of any wear that may occur. In order to adjust the positions of the chests, they are provided with two or more coiled springs, *f f*, bearing against the rear side of the chest and against the standards C′. The springs may be mounted in any desired way, though I prefer to hold them in place by means of screws-rods f^1 f^1 inserted into the standards C′, and by nipples or studs f^2 f^2 on the rear side of the chest.

f^3 f^3 are nuts on the rods f^1, whereby the tension of the springs can be readily adjusted. By these devices not only can the wear produced by the cylinders be taken up, but the chest can also be arranged and adjusted with reference to the pressure of the water or steam upon the bearing-surfaces.

The frames F, in which the chests are supported, are securely and rigidly joined together at their outer ends by means of a triangular brace, F′, or other suitable device.

It will now be seen that by constructing and mounting the cylinders of an oscillating engine in the manner described I am enabled to attain several very desirable ends.

On account of the increased distance between the pivot or trunnion and the crank there will result, with an equal or less throw of piston, much less oscillation of cylinder, and a much more direct thrust upon the shaft. Moreover, in this way an oscillating engine can be mounted on a single rear trunnion entirely separate from any valve mechanism and from the supply and exhaust mechanism, and an open space can be provided between the cylinder and the trunnion, in which space may be placed the stationary valve mechanism and the supply and exhaust mechanism; and by thus arranging the parts I am enabled to have a rear trunnion and a fixed valve mechanism separate from each other and both in rear of the cylinder, which matters will be recognized as advantageous by those versed in the art to which my invention pertains.

The water and steam may be supplied and exhausted by any ordinary or desired devices. I prefer to supply and exhaust by means of the mechanism shown in Figs. 1, 2, and 7. In these figures G G^1 represent supply-pipes, and G^2 G^3 represent waste-pipes, provided, respectively, with stop-cocks *g* g^1 g^2 g^3 of any suitable construction.

The chest E of the first cylinder, A, is provided with three-part elbows, as shown at H H′—one for each of the chambers *e* e^1 e^2 e^3—which elbows are connected to the chest by screw-threaded tubes *h h* inserted at one end into the apertures h^1 h^1, (see Fig. 3, dotted lines,) and at the other ends engaging with the elbows. h^2 h^2 are lock-nuts upon the tubes *h h*.

The water is conveyed to the elbow H from the main G by means of a hose, I, clamped to the pipes by means of the clamps *i i′*. (See Figs. 1 and 7.) These clamps are made in two semicircular parts, which are forced together by set-screws.

The water is exhausted from the cylinder A through the elbow H′, the hose I′, and the waste-pipe G^1.

The chest of the second or intermediate cylinder, A^1, is also provided with three-part elbows K and K′, but of a shape different from that of those used with the first cylinder, A. Each has a straight arm, *k*, for uniting it with the chest, and two bent arms, k^1 and k^2, adapted to respectively receive the hose that extends from the other cylinders. These elbows of the chest E^1 are fully shown in rear elevation in Fig. 2.

L L′ represent sections of hose connecting the chests of the first and second cylinders.

The chest of the third cylinder, A^2, is provided with two-part elbows, as shown at M M′, joined to the chest in the manner described, and to the elbows K K′ of the second cylinder by means of hose-sections N N′.

The lower hose and elbows are not shown in the drawings, they being situated directly behind those shown. However, their respective relative positions are fully shown in Figs. 2 and 7, two being inside the yokes C C and the other two outside the same.

It will now be seen that if the stop-cocks g^2 g^3 be closed and the cocks *g* g^1 be opened, the chambers *e* in the various chests become supply-chambers for their respective cylinders, and the chambers e^1 become exhaust-chambers, and that the resulting movements of the water or steam will cause a rotation of the shaft in one direction; but if the cocks *g* and g^1 be closed and g^2 g^3 be opened, the chambers e^2 and e^3 will become, respectively, the supply and exhaust chambers, and the direction of the shaft's rotation will be reversed.

Hose-couplings between the cylinders are preferable to metal pipes or other rigid connection, from the fact that more or less of play must be allowed in order to accommodate the chests in their movements.

What I claim is—

1. In combination with an oscillating cylinder, a pivot or trunnion supported independently of and apart from the supply and exhaust mechanism, and provided with a bearing for the cylinder at a point behind the rear end of the cylinder, substantially as and for the purposes set forth.

2. In combination with a stationary supply and exhaust mechanism, an oscillating cylinder supported in position independently of said mechanism, whereby said mechanism may be removed without moving the cylinder, substantially as set forth.

3. An oscillating cylinder mounted upon a rear pivot or trunnion, so as to leave an open space between the cylinder and the pivot, adapted to receive the supply or exhaust mechanism, substantially as set forth.

4. In combination with the loosely-mounted chest E, situated behind the rear end of the cylinder, a fixed support, C′, the spring *f*, arranged to bear against the chest and the support C′, and to move the chest toward the cylinder, substantially as set forth.

5. In an engine having two or more oscillating cylinders, in combination with the cylinders, the elbows H H′, adapted, substantially as described, to supply two of the engines on horizontal lines.

6. In combination with the intermediate cylinder A^1, the elbows K K′, constructed and arranged as specified.

7. In a water-engine, in combination with a movable chest, a flexible pipe for supplying or exhausting, substantially as set forth.

8. In an oscillating engine, in combination with the chest and the elbows, arranged substantially as specified, the connecting-tube *h*.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

WALTER S. WILKINSON.

Witnesses:
JAS. C. G. UNDUCT,
H. H. BLISS.