(No Model.)

2 Sheets—Sheet 1.

S. MALTBY.

OSCILLATING ENGINE.

No. 365,267. Patented June 21, 1887.

Fig. 1.

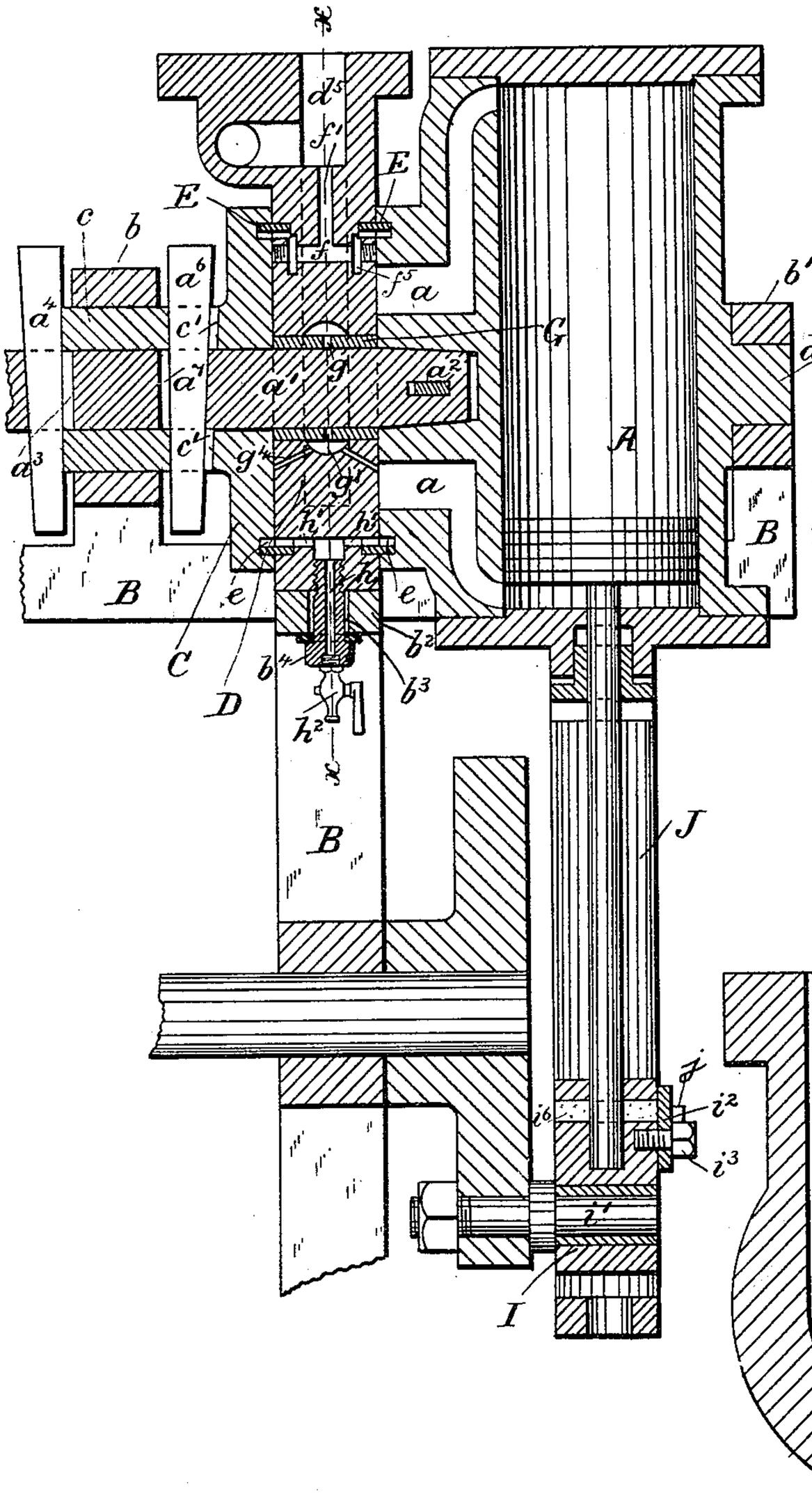


Fig. 2.

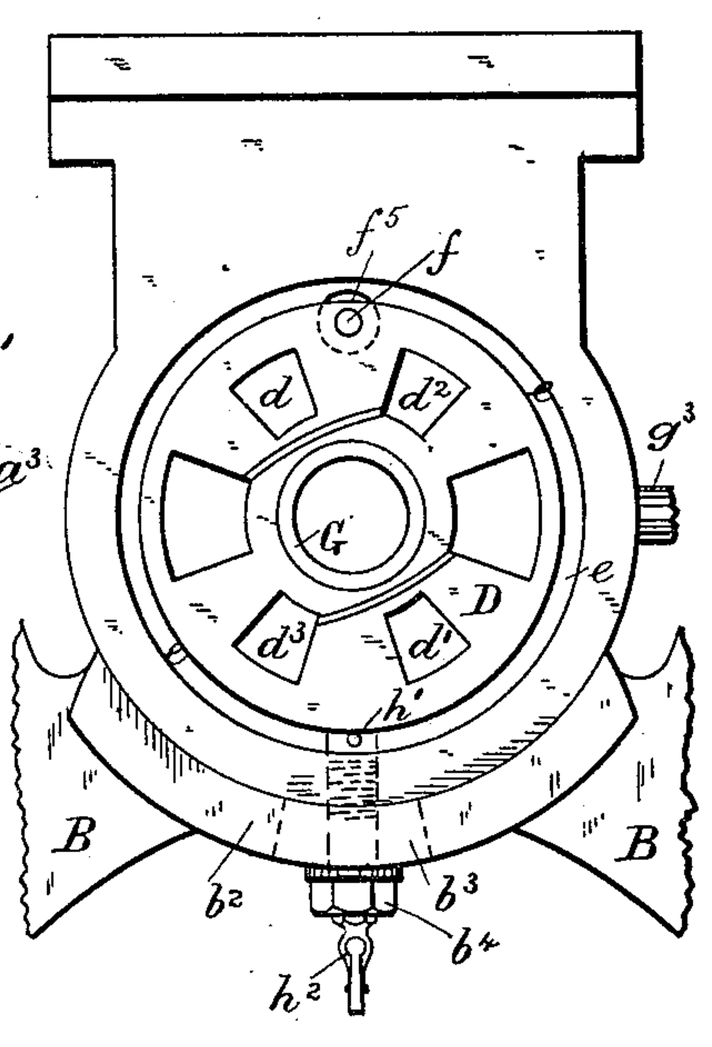
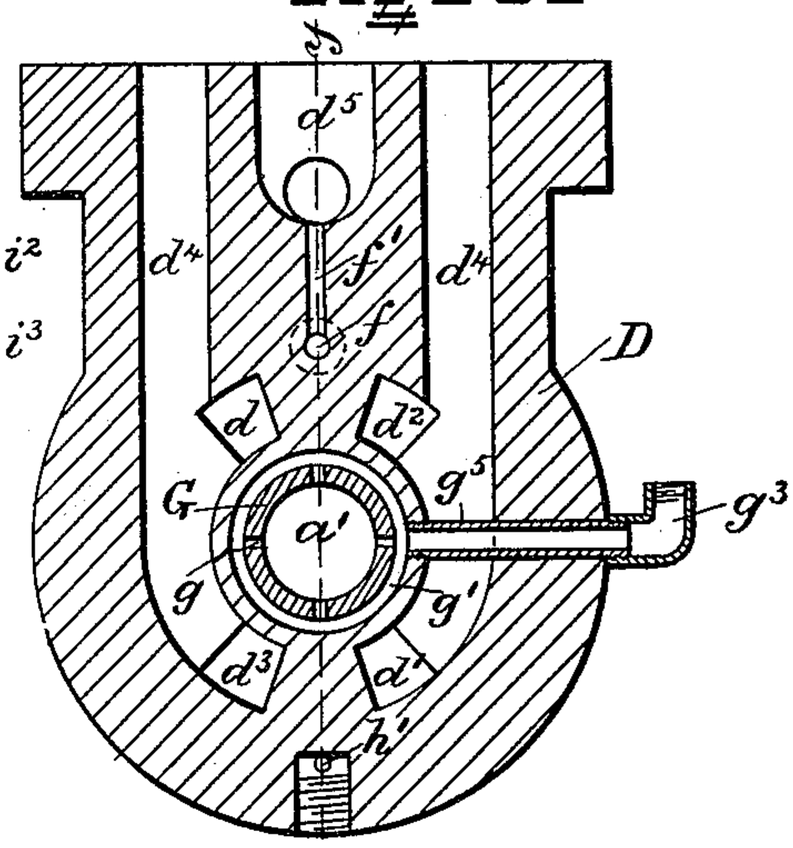


Fig. 3.



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Wm R. Davis

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By his Attorney
Herbert W. J. Jenner.

(No Model.) 2 Sheets—Sheet 2.

S. MALTBY.

OSCILLATING ENGINE.

No. 365,267. Patented June 21, 1887.

Fig. 4.

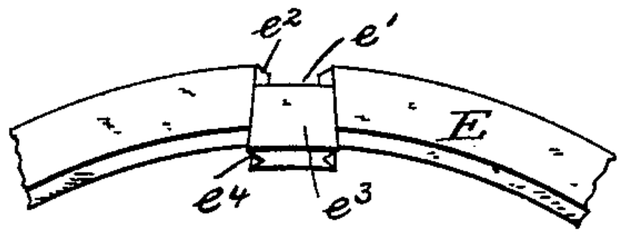


Fig. 5.

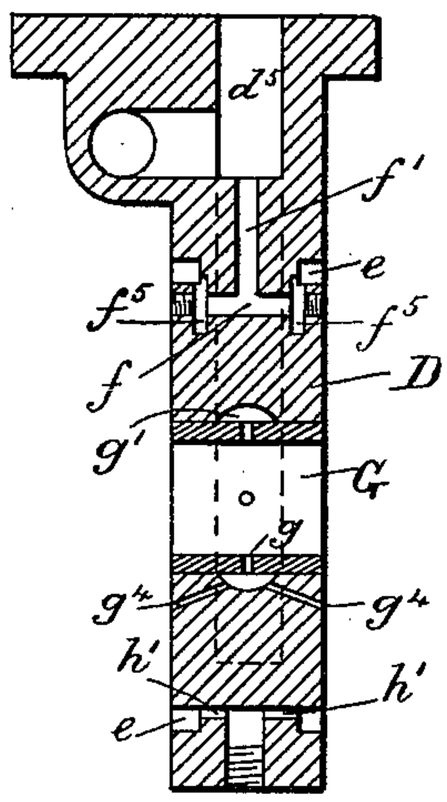


Fig. 6.

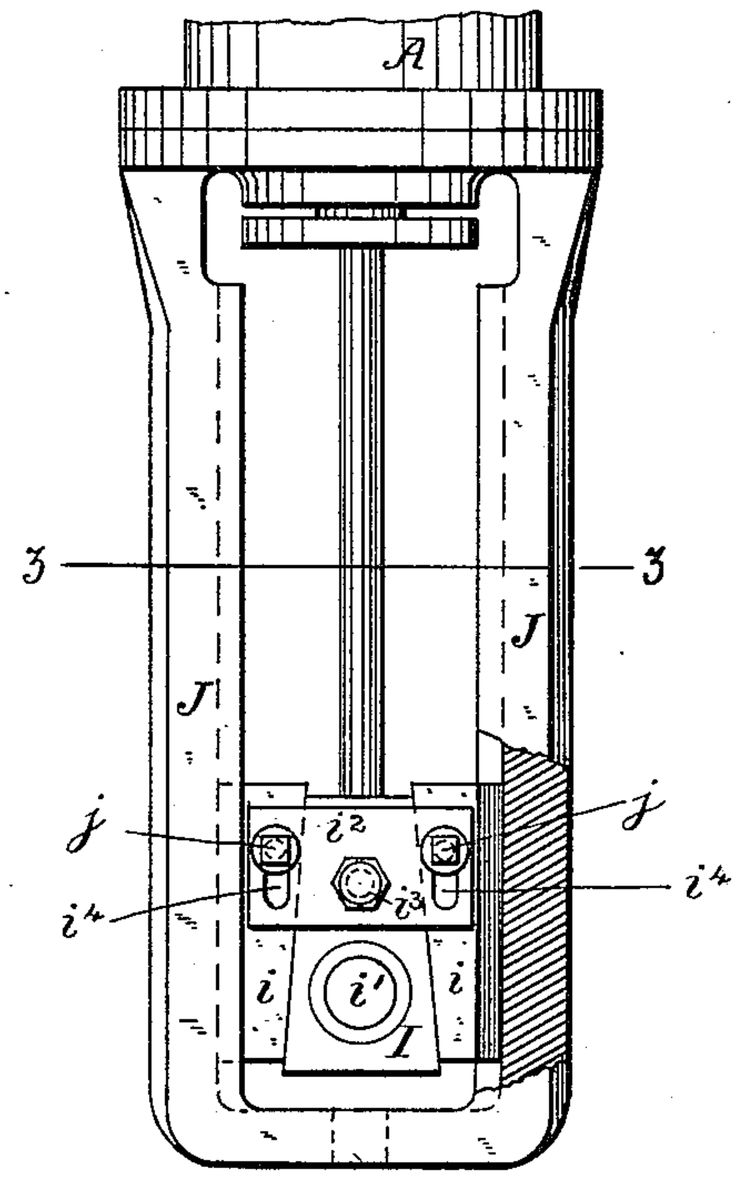
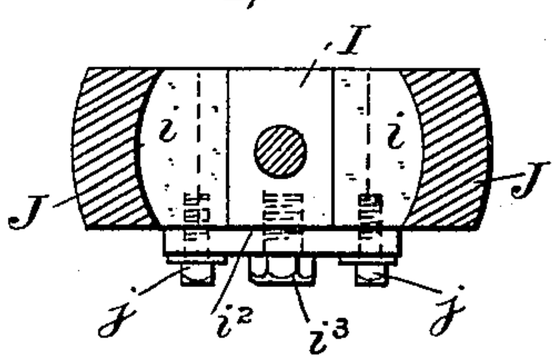


Fig. 7.



Witnesses
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UNITED STATES PATENT OFFICE.

SIDNEY MALTBY, OF WASHINGTON, DISTRICT OF COLUMBIA.

OSCILLATING ENGINE.

SPECIFICATION forming part of Letters Patent No. 365,267, dated June 21, 1887.

Application filed September 3, 1886. Serial No. 212,614. (No model.)

To all whom it may concern:

Be it known that I, SIDNEY MALTBY, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Oscillating Engines; and I 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 appertains to make and use the same, reference being had to the accompanying drawings, and to the letters or figures of reference marked thereon, which form a part of this specification.

This invention relates to the class of engines shown and described in Letters Patent No. 301,378, issued to me on July 1, 1884; and it consists in the novel construction and combination of the parts, hereinafter fully described and claimed, by which the valve faces are adjusted, packed, and lubricated.

This invention may also be applied to many other engines besides the one described in the above-mentioned patent—as, for instance, the engine shown and described in Letters Patent No. 301,379, issued to me on July 1, 1884.

In the drawings, Figure 1 is a vertical section through the engine-cylinder, valve, and other parts. Fig. 2 is a side view of the valve face, which works next to the cylinder. Fig. 3 is a cross-section through the valve, taken on the line $x\ x$ in Fig. 1. Fig. 4 is a perspective view of a portion of one of the packing-rings, showing the method of making the joint. Fig. 5 is a section through the valve, taken on the line $y\ y$ in Fig. 3. Fig. 6 is a side view of the cross-head and guides. Fig. 7 is a cross-section through the same, taken on the line $z\ z$ in Fig. 6.

A is the cylinder provided with steam-ports a. B is the engine-frame provided with bearings $b\ b'$ for supporting the cylinder. C is the back plate of the valve, provided with a long sleeve, c, projecting from it and journaled in the bearing b. D is the valve for regulating the distribution of steam. These parts will be more particularly described hereinafter.

The cylinder A is provided with a trunnion-shaft, a', which is journaled in the sleeve c, and is secured to the cylinder between the steam-ports a by means of the key a^2, which is driven through the tapering end of the said shaft and through the metal of the cylinder. The cylinder is further provided with the trunnion a^3, which is journaled in the bearing b'. In order that the faces of the valve may be adjusted with the greatest accuracy, the trunnion-shaft a' is provided with the taper key a^4, which passes through the keyway a^5 and bears upon the end of the sleeve c. When driven up tightly, this key a^4 causes the valve-faces to be tightly compressed between the cylinder and the back plate. A second taper key, a^6, is provided and passes through the keyways a^7 in the shaft and c' in the sleeve. This key a^6 acts in a reverse manner to the key a^4, and when driven up tightly causes the cylinder and back plate to move apart and free the valve-faces from pressure.

The method of adjusting the valve-faces is as follows: The key a^4 is first driven up, so that the valve is compressed tightly between the cylinder and back plate. The key a^6 is then driven up and causes a tensile strain to come upon the shaft a', between the keys, and a compressive strain upon the sleeve c, also between the keys. These tensile and compressive strains between the keys neutralize the tensile and compressive strains on the shaft and sleeve, between key a^6 and the engine-cylinder, due to the first tightening up of the key a^4. The valve-faces are thus relieved of pressure, but still remain in close steam-tight contact with the faces of the cylinder and back plate. The strains caused by the keys come upon lines parallel with the axis of the shaft and at right angles to the valve-faces, which are therefore adjusted with the greatest accuracy, and the strains on the shaft and sleeve between the keys hold the said parts as firmly connected together as if they were formed of a single piece of metal.

The valve D is provided with ports $d\ d'\ d^2\ d^3$, which pass through it, with the relief-cavities connected with the through-ports on opposite sides of the valve center, and with the steam-passages d^4 and exhaust-passage d^5, as shown and described in the aforesaid Letters Patent No. 301,378. The outside of the lower part of the valve is formed radial to the trunnion-shaft and rests in a similar radial bearing, b^2, on the frame B. This bearing b^2 is provided with a slot, b^3, through which the belt b^4 passes and connects the valve securely

to the frame. The slot b^3 allows the valve to be accurately set by turning it upon its axis in either direction required before the bolt b^4 is tightened up, and the radial bearing preserves the alignment of the center of the valve with the bearings b b' of the frame.

E are packing-rings applied to each valve-face, to prevent any water which may pass between them and the parts they work against from dropping on the floor. Grooves e are formed in each valve-face and in the faces which the valve works against, each groove being one-half the width of a packing-ring in depth and considerably wider than the thickness of the ring.

Each packing-ring has a wedge-shaped cut, e', the edges e^2 of which are dovetailed. A wedge, e^3, having dovetailed edges e^4, fits into the cut e'. This completes the ring and causes the outside of it to bear firmly on the joint which it covers and prevents all water from passing through it. The edges of the rings bear upon the bottoms of the grooves e and further secure the joints from leak. There is very little wear on the packing-rings E; but if it should ever be necessary to set them up they can be expanded by taking out the wedge e^3 and inserting one slightly larger.

If desired, the rings can be spring-piston rings provided with the ordinary lap at their joints.

In order to remove the water which may accumulate in the grooves e behind the rings, I provide a hole, f, in the valve having an annular groove, f^5, connecting with the groove e, and I connect the hole f with the exhaust-passage d^5 by means of the hole f'.

G is a bush of hard metal forced into the central hole of the valve and forming a bearing for the trunnion-shaft. Small holes g are formed in the bush for the passage of oil or other lubricant. These holes connect with the annular groove g', formed in the valve behind the bush. A pipe, g^5, is screwed into the metal of the valve behind the groove g', and passes through the steam-passage to the outside of the valve. The outer end of this pipe is expanded into the hole in the valve, or otherwise packed, so that no steam can get past it, and an elbow, g^3, is screwed onto the end of the pipe g^2, so that a lubricator can be attached.

The oil which passes through the bearing-bush G will lubricate the valve-face also; but, if desired, holes g^4 may be formed to connect the valve-faces with the annular grooves g' direct.

In order to prevent any water from remaining in the grooves e, which might freeze and burst the valve, I provide a hole, h, through the bolt b^4 and connect the end of it with the grooves e by means of the cross-holes h'. The end of the hole h is closed by the drain-cock h^2, or any suitable plug.

I is the engine cross-head secured by the key i^6 upon the end of the piston-rod and provided with tapering gibs i. The outside surfaces of the gibs are turned, and the guides J are bored out concentric with the cylinder, so that the cross-head may have a slight rotary motion and accommodate itself to the wrist-pin i', which is journaled in the cross-head between the gibs should the wrist-pin or crank-shaft be slightly out of line horizontally. A plate, i^2, is secured to the cross-head by the screw-bolt i^3, and the plate is provided with the slots i^4. Screw-bolts j pass through the slots i^4 and are screwed into the gibs i. When the guides become worn, the bolts j are slackened and the gibs moved to take up the play between them and the guides, which are secured to and oscillate with the engine-cylinder.

It will be seen that the means for adjusting the valve faces are applicable also when the valve is oscillated or revolved and the cylinder and back plate remain stationary.

The trunnion a^3 and shaft a' are not placed centrally between the ends of the cylinder, but lower down toward the end where the guides are, so that the guides and cylinder may be balanced and the travel of the valve increased with the same throw of crank.

What I claim is—

1. The combination of two parallel bearing plates or faces provided, respectively, with a central shaft and a sleeve fitting over the shaft, a valve or bearing interposed between the said faces, a taper key passing through the shaft and bearing on the end of the sleeve, and a second taper key passing through the shaft and sleeve for neutralizing the strain upon the valve or bearing produced by the aforesaid key.

2. The combination of two parallel bearing-faces provided, respectively, with a central shaft and a sleeve fitting over the shaft, a valve provided with through-ports interposed between the said faces, upon which the steam entering the said ports acts with equal pressure, a taper key passing through the shaft and bearing on the end of the sleeve, and a second taper key passing through the shaft and sleeve for neutralizing the strain upon the valve produced by the aforesaid key.

3. The combination of a valve provided with a central shaft-bearing, and having a portion of its exterior surface formed radial to the axis of the bearing, a supporting-frame provided with a corresponding radial bearing for the valve, a slot allowing the valve to be adjusted upon its axis without disturbing the alignment of the central shaft-bearing, and a bolt passing through the slot for clamping the valve to the frame.

4. The combination of a valve and a bearing-face having relative motion about a common axis and corresponding circumferential grooves in their meeting faces, with a packing-ring inserted in the said grooves and pressing outward upon the joint between the faces.

5. The combination of a valve and a bearing-face having relative motion about a common axis and corresponding circumferential grooves in their meeting faces, with a packing-

ring inserted in the said grooves, and a wedge having dovetailed edges fitting a cut in the ring and pressing it outward upon the joint between the faces.

6. The combination of a valve and a bearing-face having relative motion about a common axis and provided with steam and exhaust passages, and with corresponding circumferential grooves in their meeting faces, with a packing-ring inserted in the said grooves and pressing outward upon the joint between the faces, and a drain-passage through the valve connecting the exhaust-passage with the space in the groove behind the packing-ring.

7. The combination of a valve having a steam-passage in it and provided with a central hole and an annular groove in the metal round the hole, a bearing-bush forced into the central hole of the valve and having holes through it connecting with the annular groove, and a lubricating-pipe connecting the said annular groove with the exterior surface of the valve and passing through the steam-passage without permitting the steam to escape.

8. The combination of a valve and a bearing-surface having relative motion about a common axis and corresponding circumferential grooves in their meeting faces, with a packing-ring inserted in the said grooves, a frame supporting the valve, a bolt for clamping the valve to the frame and having a hole through it, a cross-hole connecting the end of the bolt with the space in the groove behind the packing-ring, and a cock or plug for closing the hole in the bolt.

9. The combination, in an oscillating engine, of guides secured to and bored out concentric with the cylinder, a cross-head secured to the piston-rod and provided with adjustable gibs revoluble between the guides, and a wrist-pin journaled in the cross-head between the said gibs.

In testimony whereof I affix my signature in presence of two witnesses.

SIDNEY MALTBY.

Witnesses:

HERBERT W. T. JENNER,

B. LEWIS BLACKFORD.