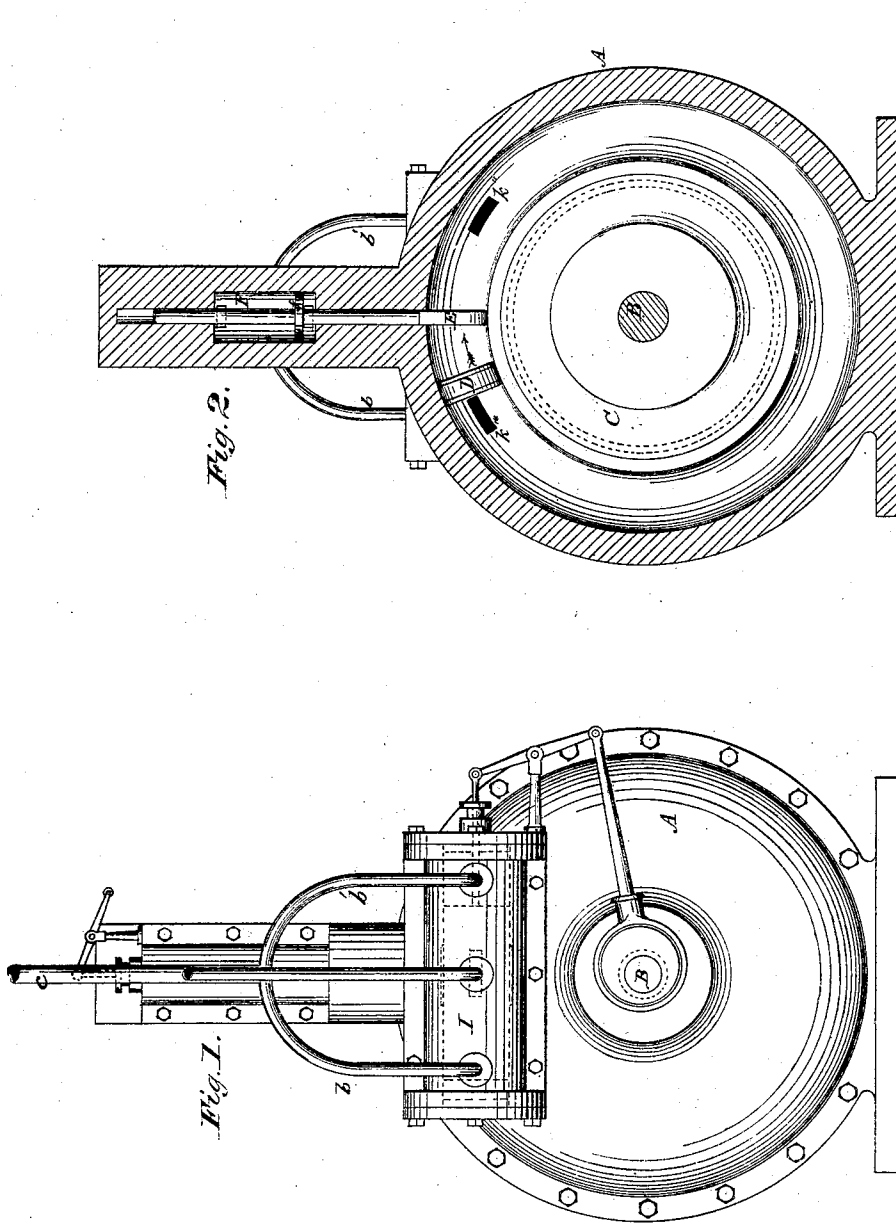


J. C. CULVER.
Rotary-Engines.

No. 135,207.

Patented Jan. 28, 1873.



Witnesses:
D. A. Ellsworth.
M. Church.

Inventor:
James C. Culver

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Fig. 3.

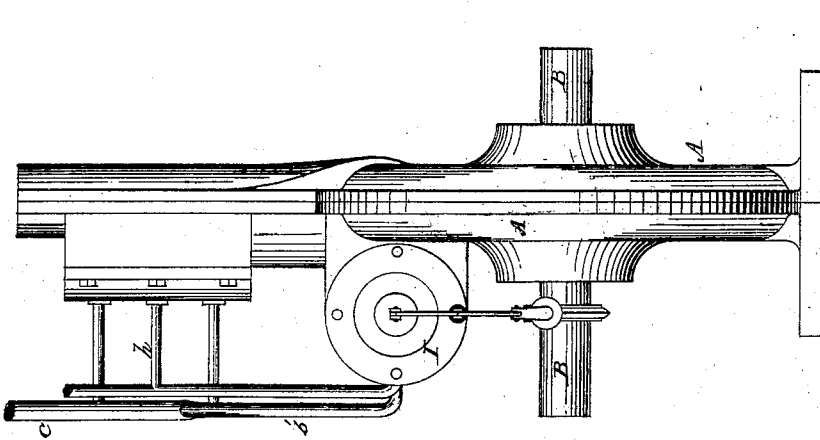


Fig. 6.

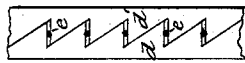


Fig. 4.

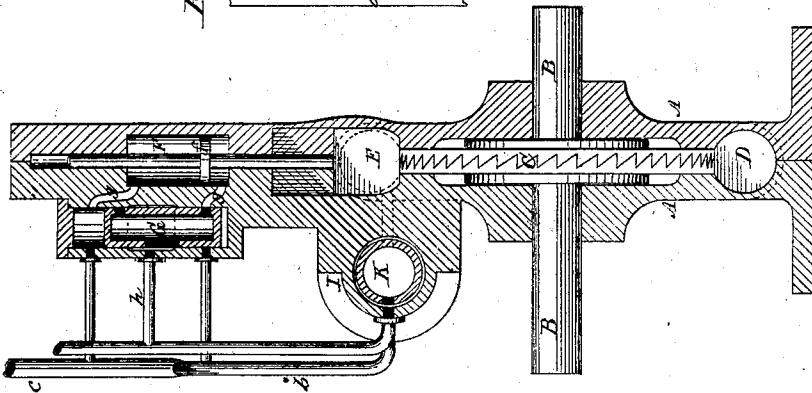


Fig. 8.

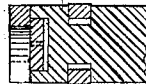
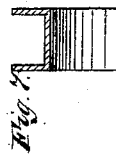
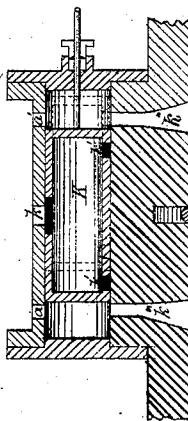


Fig. 5.



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M. Church

Inventor:

James C. Culver

UNITED STATES PATENT OFFICE.

JAMES C. CULVER, OF CLEVELAND, OHIO, ASSIGNOR OF ONE-FOURTH OF HIS RIGHT TO JOSEPH G. PETTIE, OF SAME PLACE.

IMPROVEMENT IN ROTARY ENGINES.

Specification forming part of Letters Patent No. 135,207, dated January 28, 1873.

To all whom it may concern:

Be it known that I, JAMES C. CULVER, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain Improvements in Rotary Engines, of which the following is a specification:

This invention relates to certain improvements in rotary engines; and it consists in a peculiar arrangement of a sliding abutment provided with a piston-head; also, a piston-valve for operating the revolving wheel and piston, by which the engine may be very easily reversed or stopped; also, a peculiar kind of packing for the revolving wheel; and in the construction of certain other parts, all of which will be more fully described in the following specification, enabling others skilled in the art to make and use the same, reference being had to the accompanying drawing making a part thereof.

Figure 1 is a side elevation of my engine. Fig. 2 is a vertical section of the same. Fig. 3 is an end or edge view of the same. Fig. 4 is a transverse section. Fig. 5 is a sectional detail view of the main piston-valve. Figs. 6, 7, and 8 are enlarged views of the packing.

In the drawing, A represents the outer shell or casing bolted together in the center and having projecting bearings for the shaft B, to which the revolving wheel C, provided with the piston D, is fastened. In the center and at the upper side of the casing is arranged the sliding abutment E, with a stem, *e*, extending upward and through a small cylinder, F, into which a small disk or piston, *f*, closely fits. Communicating with cylinder F are ports *g g'* to the hollow auxiliary piston-valve G that works in a small cylinder, H, cast or otherwise secured to the side of the casing A. A short distance above the shaft, and also cast to the casing A, is a horizontal cylinder, I, running transverse to the shaft, in which the main piston-valve K works. This valve is hollow, and steam is admitted to it through a center port, *k*, and passes through the ports *k' k'* at each end thereof into the ports *k'' k'''* in the casing. The steam is exhausted past the ends of the valve through the exhaust-ports *a a'* and into the exhaust-pipes *b b'*, which are connected in the center in one pipe, *c*, as best seen in Fig. 1. The steam-ports *k''* in the

casing form both the inlet and outlet ports, and are best seen in Figs. 2 and 5. A cavity in the center part of the shell around the piston-valve is provided for admitting steam, by which a balance-valve is made thereof, it working with very little friction. This valve is operated from the main shaft by a suitable eccentric and connecting mechanism. The wheel C is provided on its outer periphery with a packing of peculiar construction, best seen in Figs. 4 and 6, being of two pieces, *d d'*, of saw-tooth shape, and, as the steam is admitted on the right-angled joints, it forces the pieces in opposite directions, the angular joints sliding upon each other. Steam is admitted through the small holes *e*, shown in Fig. 6, thus packing the wheel by expanding the saw-tooth rings.

Fig. 7 is a packing of a grooved shape on its outer periphery, and, being very thin and elastic on the sides, it allows the metal to spring or be forced out against the sides of the casing by the steam, and thereby renders the joints steam-tight. If preferred, however, they may be of the form shown in Fig. 8, which I consider a modification of the same.

The operation is as follows: As soon as the piston D passes the abutment E steam is admitted through the piston-valve K and ports *k' k''* on the right, when, by the expansion of the steam (which may be varied according to circumstances) against the abutment, the revolving wheel C is forced around until the piston D passes the port *k'''* on the left, when the steam is exhausted. At the same time that steam is admitted to the main valve, steam is also admitted by a branch pipe, *h*, to the small cylinder F, and by the auxiliary piston-valve G and its ports, and said steam, pressing on the small disk or piston *f*, holds the abutment down until the valve G is reversed, admitting steam under the disk, and thereby raising the abutment E until the piston D has passed said abutment, when it is immediately forced down again to its normal position. To reverse the engine it is only necessary to reverse the operation of the main valve, and if it is desired to stop the engine the main valve need only be placed in the position shown in Fig. 5—viz., between the two ports *k'' k'''*.

The great advantages of my engine are, that it is very simple in its construction, compact and positive in its action, and it can be very easily reversed. It is also very thoroughly packed by my improved packing.

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

1. The piston-valve K with ports *k'' k''*, in combination with the revolving wheel C and abutment E, arranged substantially as set forth.

2. The valve G with its ports, in combina-

tion with cylinder F, abutment E and, disk *f*, as and for the purposes herein described.

3. The double saw-tooth packing or its equivalent on the revolving wheel C, arranged as shown, and for the purpose set forth.

4. The combination of casing A, revolving wheel C, piston-valve K, abutment E, valve G, cylinder F, and disk *f*, all arranged substantially as and for the purpose set forth.

JAMES C. CULVER.

Witnesses:

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M. CHURCH.