L. M. SHAW & A. S. BAKER.

Rotary Steam-Engines.

No. 143,723. Patented Oct. 14, 1873.

Fig 1.

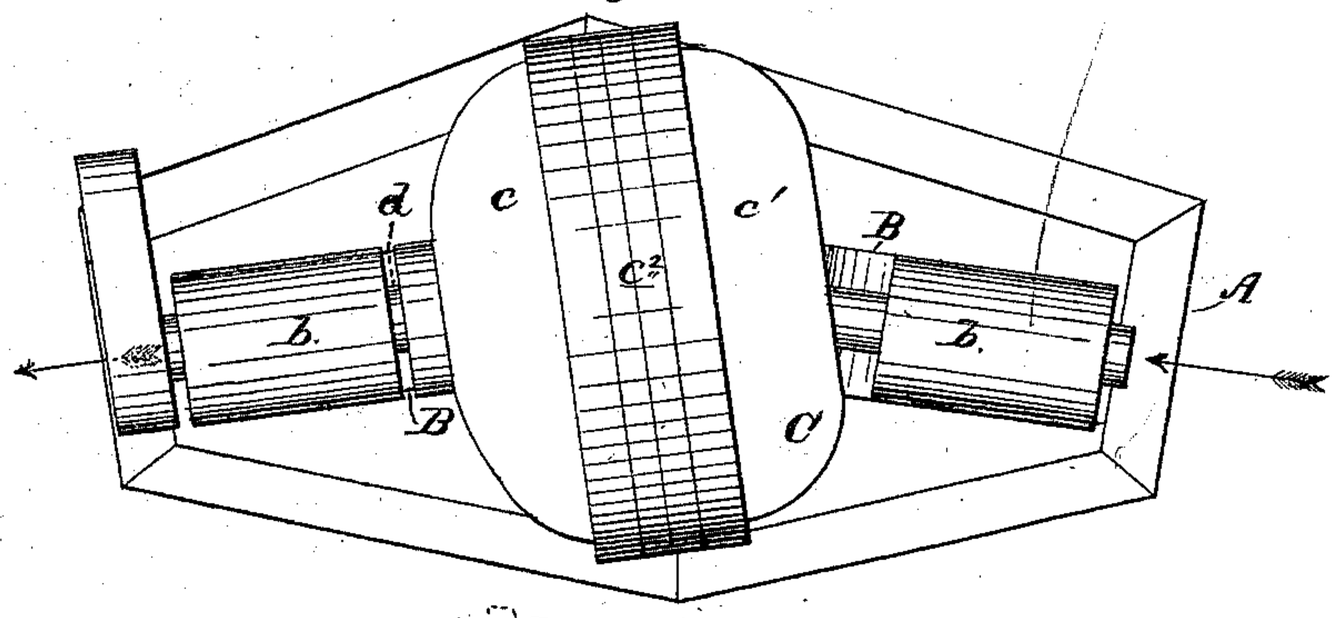


Fig 2.

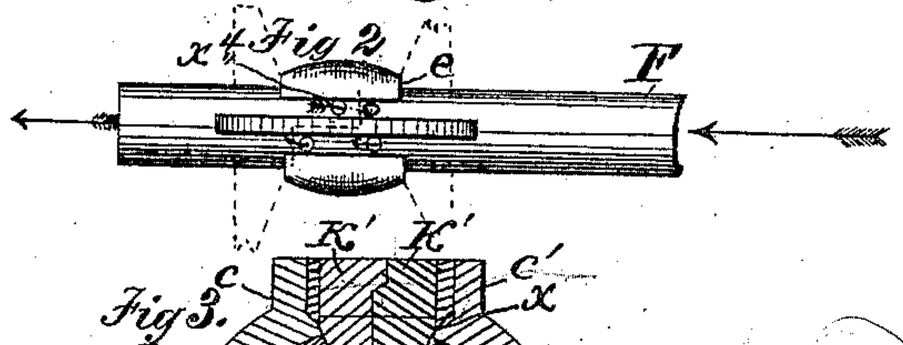


Fig 3.

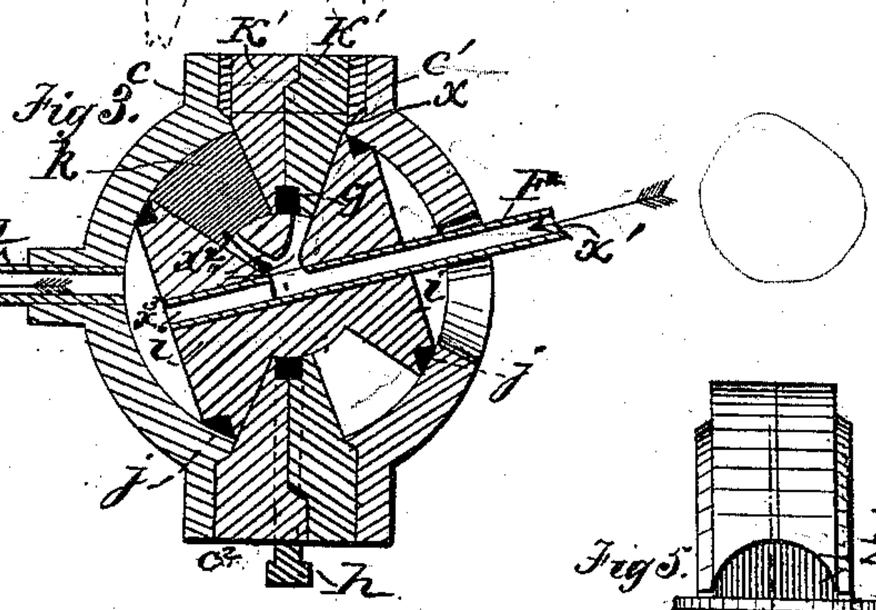


Fig 4. x

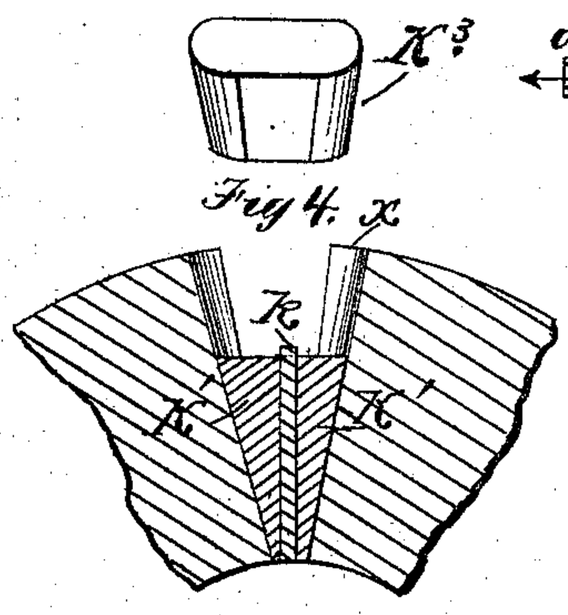


Fig 5.

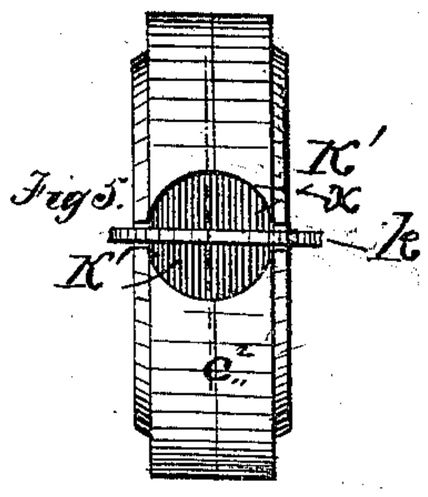
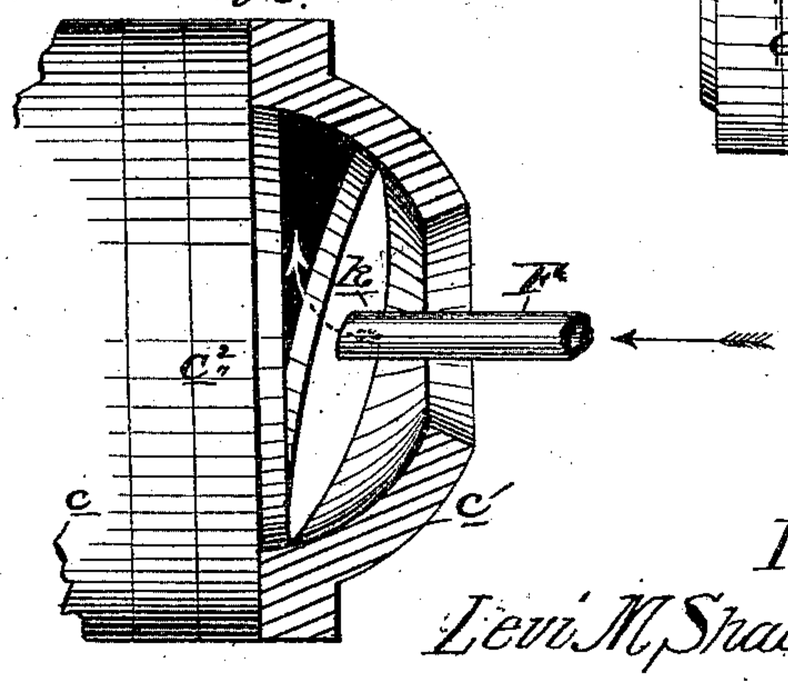


Fig 6.



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UNITED STATES PATENT OFFICE

LEVI M. SHAW AND ALLEN S. BAKER, OF EVANSVILLE, WISCONSIN.

IMPROVEMENT IN ROTARY STEAM-ENGINES.

Specification forming part of Letters Patent No. **143,723**, dated October 14, 1873; application filed April 8, 1873.

To all whom it may concern:

Be it known that we, LEVI M. SHAW and ALLEN S. BAKER, of Evansville, in the county of Rock and State of Wisconsin, have invented new and useful Improvements in Rotary Engines; and we do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings and to the letters of reference marked thereon.

This invention consists in the employment of certain devices of peculiar construction, as will be fully described hereinafter, whereby an engine of simple and durable parts is obtained which is capable of effective and economical action.

In the drawings, Figure 1 represents a plan view of our improved engine; Fig. 2, a plan view of the piston-shaft, showing the supply and exhaust ports; Fig. 3, a central sectional elevation; Fig. 4, a sectional elevation of the diaphragm and the semi-cones used for packing it; Fig. 5, a plan view of the central disk, and Fig. 6 a view in full elevation, showing the triangular steam-chamber.

To enable others skilled in the art to make and use my invention, I will now proceed to fully describe its construction.

A represents a supporting-base, and B B standards having bearings *b b* of any proper construction. C represents the case of the engine formed of the semi-spheres *c* c^1 and central piece c^2, as shown. The half *c* of the case is rigidly secured to the hollow shaft *d*, which is strongly held in one of the bearings *x*. The central portion c^2 consists of a disk formed in two parts and corresponding in diameter with the halves *c* c^1, which is provided with a tapering cylindrical slot at *x*, as shown. It has a central circular opening, in which rests the spherical projection *e* rigidly secured to the shaft F, as shown, a packing-ring, *g*, being inserted between the edge of the disk and the projection, which is adjusted to accurately fit the parts upon which it rests by means of the adjusting-screws *h* in the disk c^2. The half c^1 of the case with the central portion c^2 is rigidly bolted to the half *c* through the flanges, as shown. The shaft F is supported in the bearing *b*, and has secured to it on each side of the spherical projection *e*, the piston-heads *i i*, of identical construction, each consisting of a disk having its outer side flat and its inner side inclined, its edge also being provided with a packing-ring, *j*, as shown. *k* represents a diaphragm, which is secured upon its inner edge to the spherical projection *e*, and upon either side to a piston-head, as shown, its outer edge being provided with a suitable packing, which rests against the case. K^1 K^1 represent bearing-blocks, which rest in the slot of the central disk, one upon each side of the diaphragm, and pack the same. K represents a follower, which holds the blocks in place and closes the opening. The shaft F is provided with a steam-passage, x^1, having ports x^2, through which steam is supplied to the engine, and also with a passage, x^3, having a port, x^4, Fig. 2, through which steam is discharged from the engine. The shaft F is not held in line with the shaft *d*, but at an angle from it, so that the inclined faces of the piston-head upon opposite sides of the disk bear at one point against the faces of the disk, as shown. The bearing-blocks K^1 K^1 permit the diaphragm to move freely between them, they themselves also turning in their bearings to adjust themselves to the movements of the diaphragm. The central disk c^2 is made in halves, in order that the packing-ring may be readily inserted in place.

The operation of our improved engine is as follows: Steam is admitted through the shaft F and port x^2 into a triangular chamber formed by the piston-head, the central disk, the diaphragm, and the case, as shown in Fig. 5. When thus admitted the steam, of course, presses equally in all directions, but as the parts are immovable laterally movement cannot take place in that direction, and the diaphragm, which has no power of resistance, is consequently forced to revolve by the direct pressure of the steam. By the movement of the diaphragm all the parts, of course, are caused to revolve.

The movement of the diaphragm may be explained as follows: In consequence of the piston-heads being located at an angle to the disk, it follows when the parts revolve that any given point upon the piston-head will come in contact with the disk at only one point in its revolution, and the remainder of the time it will be

approaching and receding from that point. Hence the wall of the diaphragm, which is connected to the piston-heads, and has a reciprocating movement through the central disk, at one point in its revolution is entirely exposed upon one side of the disk, and not at all upon the other, because the part of the piston-head to which it is attached bears against the disk, and at the end of a half-revolution from this point it is entirely exposed upon the opposite side and not all upon the other.

From this construction it follows that the revolution of the parts will cause a triangular steam-chamber, with the wall of the diaphragm for its base, to be formed upon one side or the other of the diaphragm at each half-revolution of the engine, and that the chamber is constantly enlarged as the parts revolve until the revolution is completed, when the supply of steam is cut off by the piston and disk coming together over the supply-port and closing it, and the steam is discharged through the exhaust-opening.

The supply-port is so constructed, as shown, as to supply steam to the diaphragm upon either side of the disk, and as the diaphragm is always exposed upon one side or the other it follows that the pressure of steam is constant.

The described construction is advantageous, because of the simplicity of the parts, the small amount of friction produced, the absence of dead-centers, the use of steam expansively, and the employment of the direct pressure of the steam. The construction of the piston with its spherical projection is advantageous, because by means of it and the set-screws it can be readily centered in the case.

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

1. The combination of the inclosing-case, the piston-heads set an angle, the connecting-diaphragm, and central disk and hollow shafts F *d* forming the steam-passage, all the parts being adapted to revolve together, substantially as described.

2. The combination of the shaft F having the piston-heads attached thereto, as described, with the case *c c'* having an opening upon one side, as shown, the position of the piston-heads relative to the case being changed by the revolution of the case, as described.

3. The combination of the central disk, the diaphragm, and the oscillating bearing-blocks K^1 K^1, as described.

4. The engine described, consisting of the base A, standards B B, case C, constructed as described, piston-heads, diaphragm, and shafts, the case and its interior parts being adapted to revolve together, substantially as described.

5. The combination of the spherical projection *e* upon the shaft F, with the packing-ring *g* and adjusting set-screws, as described.

This specification signed and witnessed this 31st day of March, 1873.

LEVI M. SHAW.
ALLEN S. BAKER.

Witnesses:
JAMES H. HOSKINS,
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