F. STARKENBERG.
Rotary-Engine.

No. 202,882. Patented April 23, 1878.

Fig. 1.

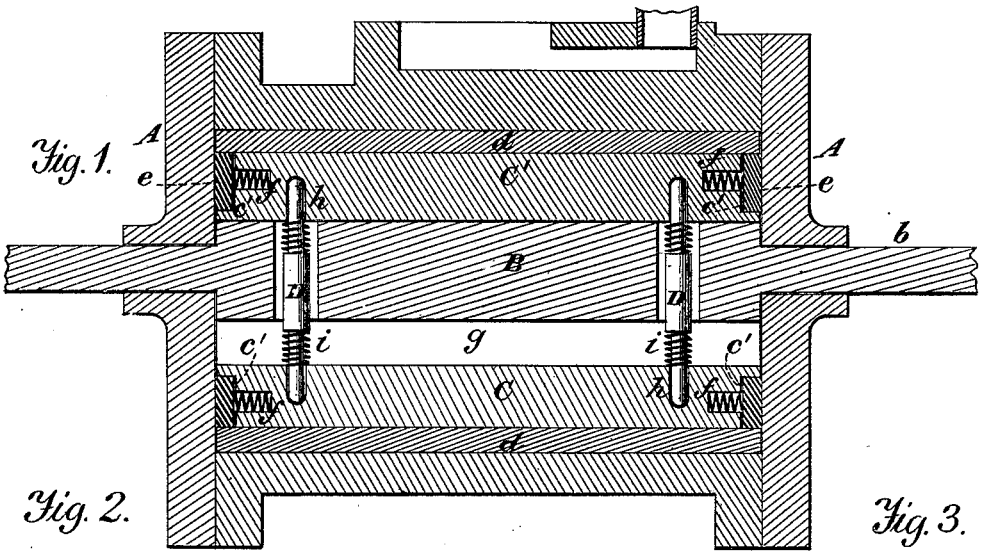
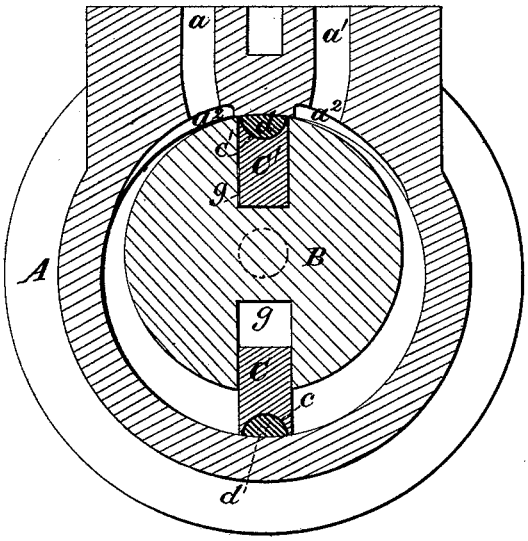


Fig. 2.

Fig. 3.



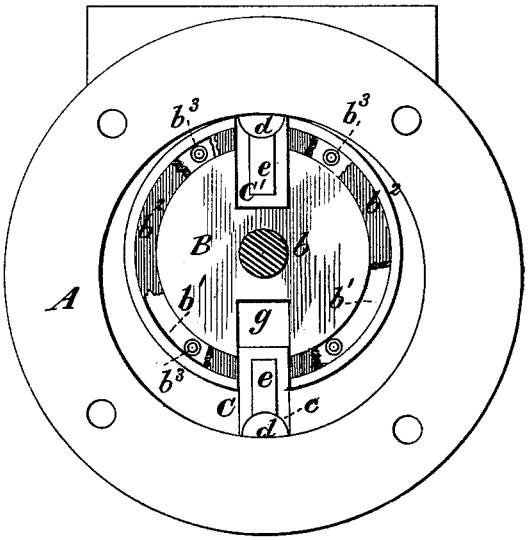
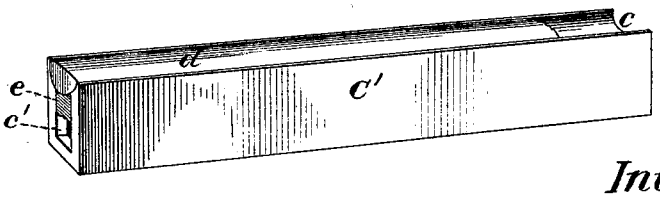


Fig. 4.



Witnesses.
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James A. Lange.

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per Edson Bros.
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UNITED STATES PATENT OFFICE.

FELIX STARKENBERG, OF NEENAH, WISCONSIN, ASSIGNOR OF ONE-HALF HIS RIGHT TO ADOLPH PFEIFFER, OF SAME PLACE.

IMPROVEMENT IN ROTARY ENGINES.

Specification forming part of Letters Patent No. **202,882**, dated April 23, 1878; application filed March 15, 1878.

To all whom it may concern:

Be it known that I, FELIX STARKENBERG, of Neenah, in the county of Winnebago and State of Wisconsin, have invented certain new and useful Improvements in Rotary Steam-Engines; and I do hereby declare that the following is a full, clear, and exact description thereof, 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 the letters of reference marked thereon, which form a part of this specification, and in which—

Figure 1 represents a vertical longitudinal section of my improved rotary engine. Fig. 2 represents a vertical transverse section of the same. Fig. 3 represents an end view thereof, with one of the cylinder-heads and portions of the end packing removed; and Fig. 4 is a detached perspective view of one of the pistons.

Corresponding parts in the several figures are denoted by similar letters of reference.

This invention appertains to certain improvements in rotary steam-engines, by which the mechanism for extending and retracting the pistons as they are carried around with their cylinder or eccentric is simplified, and they and their eccentric fitted thoroughly steam-tight.

The nature of this invention consists in combining, with spring-rods and an inner longitudinally-grooved cylinder or eccentric, through which said rods pass, pistons having longitudinal concaved grooves, which receive packing or bars adapted or constructed to conform to the contour of said grooves, and having coincident faces with the inner circumference of the outer cylinder, substantially as hereinafter more fully set forth.

In the annexed drawing, A refers to the steam-cylinder, provided with the usual steam-chest and slide or puppet valve. a a^1 are ports in the upper part of the cylinder A. Extending along the inner circumference of the cylinder A from and to suitable distances either side of the said ports are steam-passages a^2 a^2, to prevent the steam being wholly cut off, and thus providing a steam or elastic cushion for the piston and cylinder. B is an inner cylinder, eccentrically hung in the heads of the steam-cylinder A, upon its shaft b, suitably journaled in position, and from which motion is transmitted to the machinery to be driven. In the heads or ends of the cylinder B are semicircular grooves b^1 b^1, which receive correspondingly-shaped bars or packing b^2 b^2, preferably of metal. In the bottoms of the grooves b^1 b^1 are recesses to receive springs b^3 b^3, which press the metallic packing b^2 b^2 against the heads of the steam-cylinder A, to cause the same to fit thoroughly steam-tight.

C C′ are the pistons, which consist, preferably, of oblong or rectangular pieces, provided in their faces and ends with grooves or recesses c c', the grooves in their faces being concaved, and receiving correspondingly-shaped removable strips or packing d d, the faces of which coincide with the inner circumference of the steam-cylinder, against which they bear. By thus concaving the grooves in the faces of the pistons and fitting the packing therein, the packing or inflexible strips or bars d d are enabled to automatically adapt themselves to the curvature of the inner circumference of the cylinder A as the pistons and packing are being carried around by the eccentric.

The recesses or grooves in the ends of the piston C C′ receive blocks or packing e e, preferably of metal, and are pressed against the heads of the cylinder A by springs f f, let into recesses extending inwardly from, and communicating with, the end grooves or recesses c' c'. These pistons fit in deep longitudinal grooves g g, made in the cylinder B, and upon shouldered rods D D, passing transversely through said cylinder, the reduced portions of which enter sockets or recesses h h in the opposite edges of the said pistons. i i are springs, placed around or upon the rods D D, and pressing the pistons outwardly against the cylinder A, and which permit of the retraction of the pistons as they are carried around with their eccentric toward the upper surface of the cylinder A. The steam, entering the cylinder A through the port a, will strike the piston C, and rotate its cylinder or eccentric B, which, in turn, will impart motion to its shaft b, driving the machinery. The rotation of the cyl-

inder B, by the impact of steam against the piston C, will carry the other piston, C′, past the port *a*, when it will be acted on the same as piston C; and as they continue to be carried around, the pressure against the piston C will be exhausted through the port *a*, and the piston C again receive a second impact of steam, and so on.

The above arrangement of parts produces a powerful engine.

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

In a rotary engine, the combination, with the cylinder A, inner cylinder or eccentric B, provided with deep longitudinal grooves *g g*, and rods D D, having springs *i i*, and passing through said eccentric, of the pistons C C′, provided in their faces with longitudinal concaved grooves *c c* and packing *d d*, adapted or constructed to conform to the concavity of said grooves *c c*, and provided with coincident faces with the inner circumference of the cylinder A, substantially as and for the purpose set forth.

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

FELIX STARKENBERG.

Witnesses:

JOHN STUPP,

LUDWIG RIEDER.