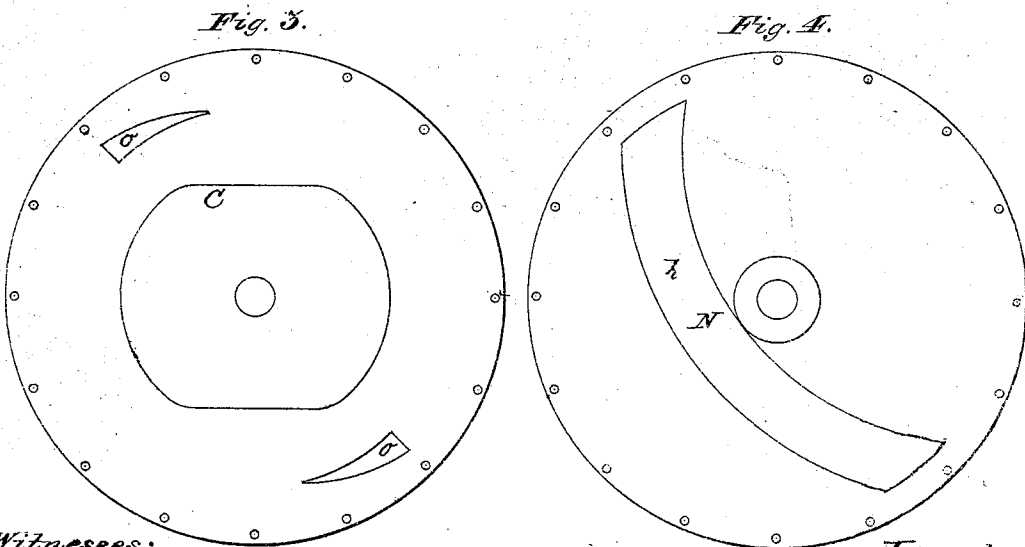
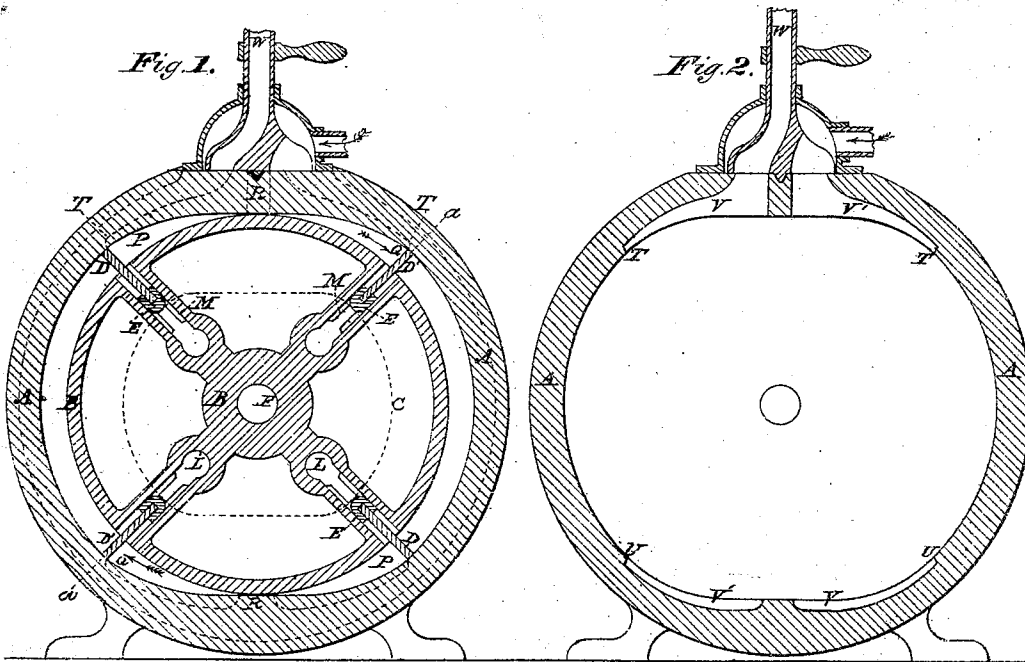


E. S. BENNETT.

Rotary-Engines.

No. 134,123.

Patented Dec. 24, 1872.



Witnesses:

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J. B. Connolly.

Inventor,

Ernest S. Bennett

E. S. BENNETT.

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Fig. 5.

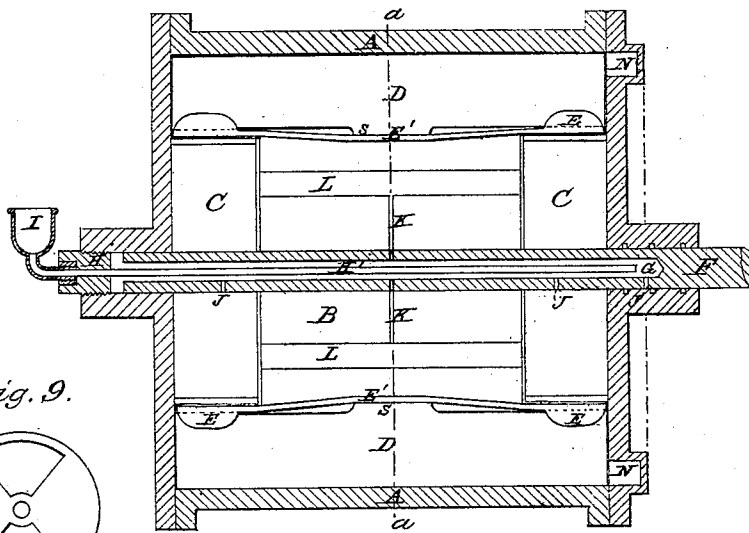


Fig. 9.

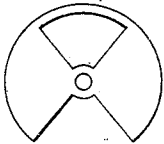


Fig. 8.

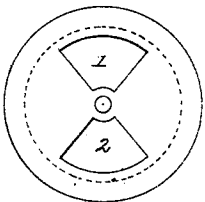


Fig. 7.

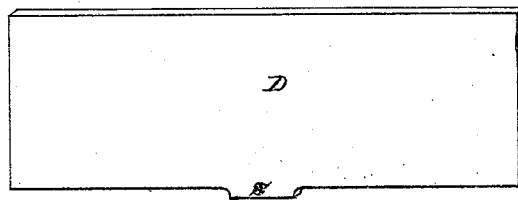
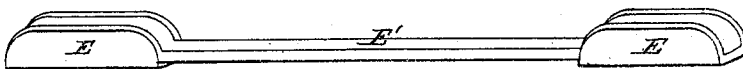


Fig. 6.



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UNITED STATES PATENT OFFICE.

ERASTUS S. BENNETT, OF BROOKLYN, NEW YORK, ASSIGNOR TO HIMSELF,
THEODORE E. PERKINS, RICHARD B. THOMPSON, HENRY McCLELLAN,
AND EDWARD McCLELLAN, OF SAME PLACE.

IMPROVEMENT IN ROTARY ENGINES.

Specification forming part of Letters Patent No. 134,123, dated December 24, 1872.

To all whom it may concern:

Be it known that I, the undersigned, ERASTUS S. BENNETT, of the city of Brooklyn, in county of Kings, State of New York, have invented certain Improvements in the construction of Rotary Engines and Pumps; and I do hereby declare that the following is a clear and exact description thereof, reference being had to the accompanying drawing and to the letters of reference marked thereon.

The nature of my invention consists chiefly in an improved form of outer cylinder whereby friction is lessened and other points of advantage gained; in the manner of fitting the pistons so as to make them tight at the least expense; in supplying spring-shoes to the pistons to keep them in position, compensate for their wear, and furnish an increased bearing; in providing a lubricating device whereby the engine is perfectly lubricated, (the lubricating matter being distributed by centrifugal force;) and in the combination and arrangement of the various parts.

In the accompanying drawing which forms a part of this specification, Figure 1 represents an end view of my engine, the head removed—ports, recesses, and cam by dotted lines, and the valve in half-section; Fig. 2 represents a cross-section of same, (in the direction of dotted line *a a* in Fig. 5,) of outer cylinder, valve, steam-chest, ports, and recesses; Fig. 3 represents the inside view of the head, with cam and openings to steam-channel way; Fig. 4 represents the outside view of the head, shaft-bearing, and steam-channel way; Fig. 5 represents a longitudinal section of the engine, in the direction of dotted line *a a*, Fig. 1; Fig. 6 represents an enlarged view of the spring-shoe; Fig. 7 represents an enlarged view of the piston; Fig. 8 represents the valve-seat enlarged; and Fig. 9 represents the face of the valve correspondingly enlarged.

Similar letters represent corresponding parts.

A A, outer cylinder; B B, inner cylinder; D D D D, pistons; C C, cams, which are made fast to the heads; E E E E, spring-shoes, shown more fully in Fig. 6; F, shaft; G, hole bored longitudinally into the shaft; H H',

plug and tube, connecting oil-cup I with inner end of said hole G; J J J, holes connecting the said hole G with shaft-bearings; K K, holes connecting said hole G with each of the piston-slots L L L L; M M M M, a lining of Babbitt or other similar metal; N, channel-ways in head; o o, openings to said channel-ways, connecting one channel-way with ports P P, and the opposite one with ports Q Q. The inner cylinder B B fits snugly into the outer one at the top and bottom, so as to form a steam-tight abutment at those points marked R R. The pistons are made of plate steel, only sufficiently thick to stand the required pressure without springing. The slots L L are cast in the inner cylinder in such form as to furnish suitable cavities to firmly lock the Babbitt-metal linings M M M M in their places. The pistons being fitted are placed in proper position in their slots, and the melted metal being run around them a close-fitting lining is secured. The bottoms of the slots L L L L are cast a little larger so as to admit of the spring-shoes E E being passed through them to their positions under the pistons. A slight projection, S, is left at the bottom of each piston, to rest upon the spring-shoe and afford the spring room for action. The inner cylinder is perfectly round, while the outer cylinder is in the form of a true circle, gradually flattened at top and bottom between the points T T and U U, so as to bring the central points R R in contact with the cylinder B B. Recesses V V V V are cored out each way from the central points or abutments R R to the port-openings.

In operation, steam being admitted through the valve strikes the upper piston D' and (through the channel-way in the head) the lower piston D' simultaneously forcing them, in the direction of the arrows, to just beyond the points previously occupied by pistons D D, when the steam escapes through the exhaust W, the upper one directly, the lower one through the channel-way; meantime the pistons D D have taken the places previously occupied by D' D', and are in turn under pressure. It will be observed that, owing to the peculiar shape of the outer cylinder, the pistons do not move in their relation to the inner

cylinder while they are under pressure, and that while not under pressure the steam on the port sides has full play over their outer edges through the recesses V' V', thus balancing them while passing the abutment from port to port. The said recesses, by allowing the steam free passage over the edges of the piston while so passing from exhaust to port, entirely prevents back pressure. The inner edges of the pistons are clasped by the shoes E E E E, which rest upon the stationary cams C C, the center of said pistons S resting on the spring E'. The spring-shoes are made of steel. The object of the shoe is to keep the spring in position under the piston and to furnish suitable bearings on the cams C C, while the springs press the pistons firmly to their positions against the outer cylinder, and compensate for their wear. The engine is lubricated perfectly from the single oil-cup I by gravity and centrifugal force. An "air-cock" oil-cup supplies oil, through the plug H and to H', to the bore G in the shaft. Suitable holes J J J through said shaft furnish the bearings with oil, while the holes K K supply the slots and pistons with oil. The oil from the holes K K striking on the springs first is by them carried to the cams, and finally to the outer cylinder. Each shaft-bearing is supplied with one or more small grooves to retain the oil, which thus forms a packing, and renders packing-boxes unnecessary. No fly-wheel is required with this engine (or pump.)

For pumps I make the ports and channels larger, omit the valve at the top, and in

its stead attach an induction and eduction pipe.

What I claim as my invention, and desire to secure by Letters Patent of the United States, is—

1. The cylinder A A, when constructed substantially as set forth and provided with recesses V V' each side of the abutments R R, substantially as and for the purposes specified.

2. The metallic piston-packing M M M M, when applied, substantially as set forth, to the pistons of a rotary engine or pump.

3. The spring-shoes E on spring E', in combination with the pistons of a rotary engine or pump, substantially as and for the purpose set forth.

4. The shaft F with the hole G of a rotary engine or pump, when supplied with one or more outlets, J or K, for the purpose of conveying lubricating material to engine or pump, as shown.

5. The combination, in a rotary engine, of the pistons D and spring-shoes E and springs E', substantially as and for the purpose set forth.

6. The combination, in a rotary engine, of the cam C C, spring-shoes E E, springs E', and pistons D D', substantially as and for the purpose set forth.

City of Washington, D. C.

ERASTUS S. BENNETT.

Witnesses:

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