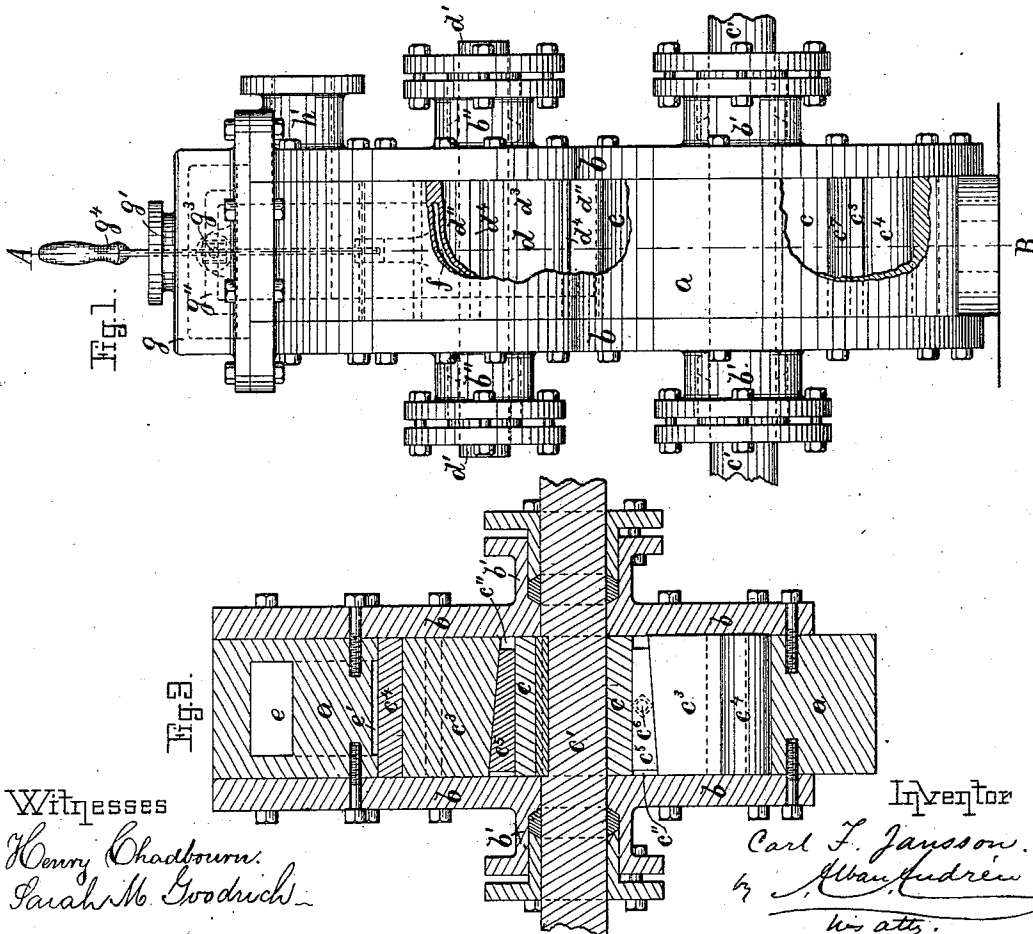


C. F. JANSSON.  
ROTARY ENGINE.

Patented Mar. 10, 1885.



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# UNITED STATES PATENT OFFICE.

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## ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 313,500, dated March 10, 1885.

Application filed November 17, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, CARL F. JANSSON, a citizen of Sweden, now residing at Manchester, in the county of Hillsborough and State of New Hampshire, have invented certain new and useful Improvements in Rotary Engines; and I do hereby declare that the same are fully described in the following specification and illustrated in the accompanying drawings.

This invention relates to improvements in rotary engines, and it is carried out as follows, reference being had to the accompanying drawings, where—

Figure 1 represents a sectional end elevation of the improved rotary engine. Fig. 2 represents a longitudinal section on the line A B, (shown in Fig. 1;) and Fig. 3 represents a cross-section on the line C D. (Shown in Fig. 2.)

Similar letters refer to similar parts wherever they occur on the different parts of the drawings.

*a* represents the frame or shell of the engine, to the ends of which are secured, in a suitable manner, the heads *b b*. The shell *a* contains in its lower end the cylindrically-bored-out piston-chamber *a'*, and in its upper end the cylindrically-bored-out abutment-chamber *a''*, which chambers are in open communication with each other, as is common in rotary engines.

Within the piston-chamber *a'* is located the piston-cylinder *c*, upon the driving-shaft *c'*, to which it is keyed or otherwise firmly secured, and said shaft projects through and has its bearings in the stuffing-boxes *b' b'* in the heads *b b*, as shown in Fig. 1.

Within the abutment-chamber *a''* is located the abutment-cylinder *d* upon the shaft *d'*, to which it is keyed or otherwise firmly secured, and said shaft projects through and has its bearings in the stuffing-boxes *b'' b''* in the heads *b b*, as shown.

The piston-cylinder *c* is provided with a pair of diametrically-opposite radial grooves, *c'' c''*, in which are fitted the respective radial pistons *c<sup>3</sup> c<sup>3</sup>*, to the outer ends of which are secured the respective cylindrical projections *c<sup>4</sup> c<sup>4</sup>*, the latter being preferably secured to said radial pistons by dovetailed projections and recesses, as shown in Fig. 2, although they may be attached in any other desirable or well-

known manner. The extreme outer surfaces of said cylindrical projections or piston-heads *c<sup>4</sup>* are intended to touch against the inside of the cylindrical piston-chamber *a'*, so as to effect a steam-tight connection between such parts without binding, and if leakage of steam should occur between such surfaces by the wearing out of the surfaces in contact the pistons *c<sup>3</sup> c<sup>3</sup>* may be expanded outwardly to compensate for such wear by means of the keys *c<sup>5</sup> c<sup>5</sup>*, located in the bottom of the radial grooves *c'' c''*, after which the keys *c<sup>5</sup>* are to be secured in place by means of set-screws *c<sup>6</sup> c<sup>6</sup>*, or equivalent fastening device, and if it is found necessary additional set-screws may be added to secure the pistons *c<sup>3</sup>* to the piston-cylinder *c* after said pistons have been adjusted.

The abutment-cylinder *d* is constructed as follows: It is provided on its outer periphery with a number of recesses, *d'' d''*, wide enough to permit the cylindrical projections *c<sup>4</sup>* to enter them, while the pistons and their end projections pass by the abutment-cylinder, and while in such position and motion the cylindrical projections *c<sup>4</sup>* are to fit as nearly steam-tight as is possible within the successive recesses *d'' d''*, to prevent escape at this point. Midway between each pair of successive recesses *d'' d''* is made a concavity, *d<sup>3</sup>*, on the periphery of abutment-cylinder *d*, as shown in Fig. 2, such concavity being made equal in curvature to the convexity of piston-cylinder *c*, so as to fit against the surface of the latter to effect a steam-tight connection between such surfaces, except when the pistons and their cylindrical projections pass by the abutment-chamber, at which time the steam-tight connection is accomplished by the cylindrical projection *c<sup>4</sup>* moving within the recess *d''* on the abutment-cylinder *d*.

At the sides of each recess *d''*, between it and the respective concavities *d<sup>3</sup> d<sup>3</sup>*, are made on the exterior of the abutment-cylinder *d* the surfaces *d<sup>4</sup> d<sup>4</sup>*, such surfaces being turned to fit steam-tight within the abutment-chamber *a''* to prevent the steam from passing between the said surfaces *d<sup>4</sup>* and the interior of the abutment-chamber *a''*. While the pistons *c<sup>3</sup>* are in the act of engaging with and turning the abutment-cylinder *d* a part of a revolution, the projecting surfaces *d<sup>4</sup> d<sup>4</sup>* on the latter swing into and against the concave cut-away

portions  $c^7$   $c^7$  on the exterior of the piston-cylinder  $c$ , such concave recesses being located on each side of the respective pistons  $c^3$   $c^3$ , and they are made of a curvature equal to the interior bore of the abutment-chamber  $a''$ , so as to prevent escape of steam while the projections  $d^4$  roll onto said concavities  $c^7$ , when the pistons pass by and actuate the abutment-cylinder.

o In the shell or frame  $a$  around the abutment-chamber  $a''$  are made two passages,  $e$  and  $f$ , leading from the steam-chest  $g$  to the piston-chamber  $a'$ , where it adjoins the abutment-chamber  $a''$ , and either of said passages  $e$  and  $f$  may be the inlet and outlets for the steam, according to the direction in which the engine is to run. In the drawings in Fig. 2 the passage  $e$  is shown as being the steam-inlet and the passage  $f$  as being the exhaust.

o The steam-chest  $g$  has at one place a steam-inlet,  $g'$ , leading from the boiler or other steam-supply, as usual, and within the steam-chest  $g$  is located a suitable slide-valve,  $g''$ , similar to such as are ordinarily used on steam-engines, such slide-valve being provided with a rod,  $g^1$ , and lever,  $g^4$ , or other well-known device for reversing its position, according to the direction in which the engine is to run.

o  $h$  is the exhaust-port leading from the steam-chest  $g$  to the exhaust-branch  $h'$ , to permit the exhaust-steam to escape after it has passed as live steam through the engine.

Where the steam passages  $e$  and  $f$  enter the piston-chamber  $a'$ , they are connected to the abutment-chamber  $a''$  by means of the respective transverse passages  $e'$  and  $f'$ , to permit the live steam to be admitted back of the pistons before they reach the desired steam-inlet, (according to the direction in which the engine is running,) and thus prevent a dead-center during any portion of the revolution of the piston-cylinder.

The motor may be used for steam or water power, as may be desired, and with a slight modification as a pump without departing from the essence of my invention. If the motor is to be run in one direction only—as, for instance, when used in place of a stationary engine or turbine or water-motor—the slide-valve and reversing mechanism may be dispensed with, and in such a case one passage,  $e$ , may be used constantly as an inlet, and the other passage,  $f$ , as an exhaust, or vice versa.

The operation of this, my improved rotary engine, is as follows: Supposing the slide-valve  $g''$  to be held in the position shown in Fig. 2, and steam or water admitted through passage  $e$ , it will cause the piston-cylinder  $c$  to move around its axis in the direction shown by the arrow in Fig. 2, and when one of the pistons  $c^3$  approaches the passage  $e$  the steam or water will pass through transverse passage  $e'$  into the

nearest recess  $d''$  in abutment cylinder  $d$ , and by acting back of said piston and its cylindrical head  $c^4$  will cause a continuous motion of the piston-cylinder  $c$  without producing any dead-center during the revolution of said cylinder and its pistons, the steam or water in front of the pistons being ejected through the exhaust-passage  $f$  into slide-valve  $g''$  and out through exhaust-branch  $h'$ . During the rotation of the piston-cylinder  $c$ , when any one of its piston-heads  $c^4$  approaches the abutment-cylinder  $d$ , such head  $c^4$  will enter a corresponding recess,  $d''$ , in abutment-cylinder  $d$ , and by a continuation of the motion the abutment-cylinder  $d$  will be moved one-fifth of a revolution, if its recesses are five in number, and a corresponding distance according to its number of recesses, by which leakage of steam or water is prevented during such passage in part by the head  $c^4$  fitting into recess  $d''$ , and partly by the projections  $d^4$  fitting into the concave recesses  $c^7$  on piston-cylinder  $c$ , as heretofore described. At all times, except when the pistons  $c^3$  pass by the abutment-chamber, the abutment-cylinder  $d$  remains stationary, and one of its concavities,  $d^3$ , lies against the cylindrical surface of cylinder  $c$ , as shown in Fig. 2, by which leakage of steam or water is prevented during such motion.

Having thus fully described the nature, construction, and operation of my invention, I wish to secure by Letters Patent and claim—

1. In a rotary engine, the shell  $a$ , having cylindrical piston-chamber  $a'$  and abutment-chamber  $a''$  opening into each other, combined with piston-cylinder  $c$ , its pistons  $c^3$   $c^3$ , and their cylindrical heads  $c^4$   $c^4$ , the abutment-cylinder  $d$ , with its recesses  $d''$ , surface concavities  $d^3$ , and intermediate projections,  $d^4$ , and in and out let passages  $e$   $e'$   $f$   $f'$ , leading to piston-chamber  $a'$ , as and for the purpose set forth.

2. The piston-cylinder  $c$ , having pistons  $c^3$   $c^3$   $c^4$   $c^4$  and concave recesses  $c^7$   $c^7$  on each side of said pistons, in combination with abutment-cylinder  $d$ , having recesses  $d''$ , outer concavities,  $d^3$ , and intermediate projections,  $d^4$ , for the purpose of preventing escape of steam or water during the revolution of the engine, in a manner as herein set forth and described.

3. In combination with the piston-cylinder  $c$ , its pistons  $c^3$   $c^4$ , and the abutment-cylinder  $d$ , constructed in a manner as described, the inlet and outlet  $e$  and  $f$ , with their respective transverse channels  $e'$   $f'$ , as and for the purpose set forth.

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

CARL F. JANSSON.

Witnesses:

I. C. PETTERSSON,  
SVEN. A. JOHANSON.