(No Model.) 2 Sheets—Sheet 1.

E. F. HOLMGREEN.

ROTARY ENGINE.

No. 454,738. Patented June 23, 1891.

Fig. 1.

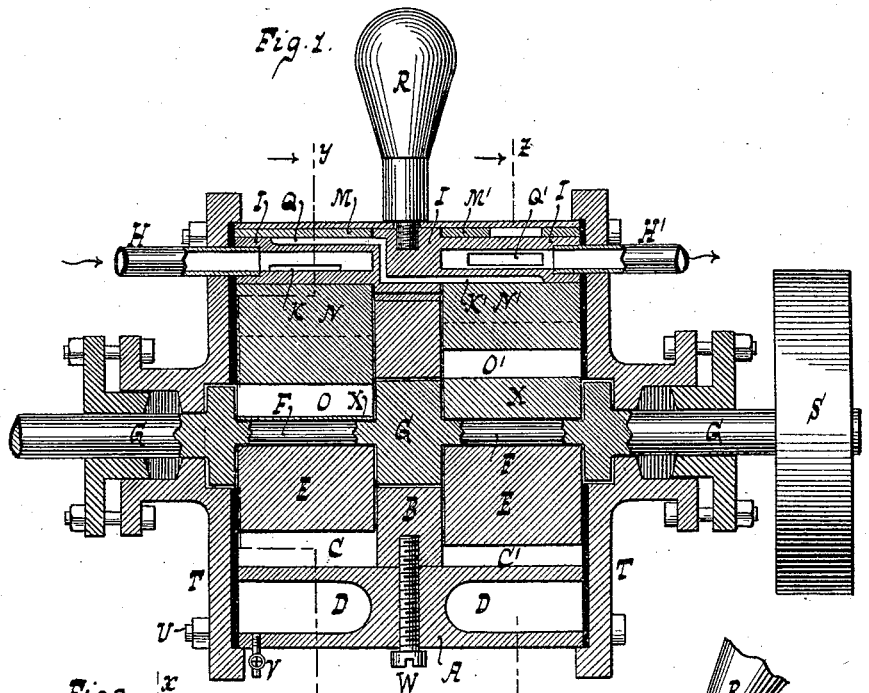


Fig. 2.

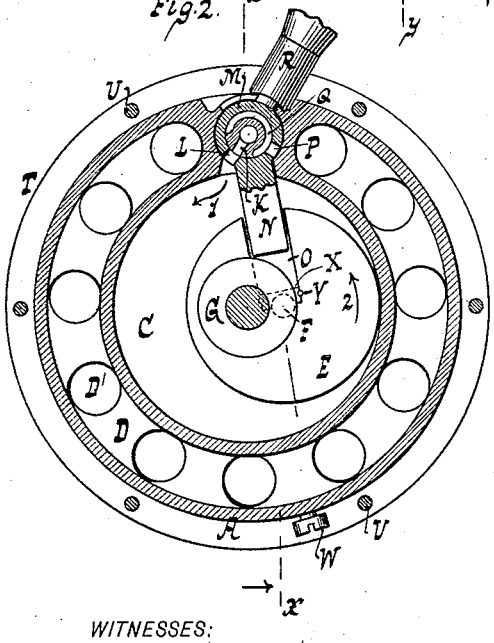
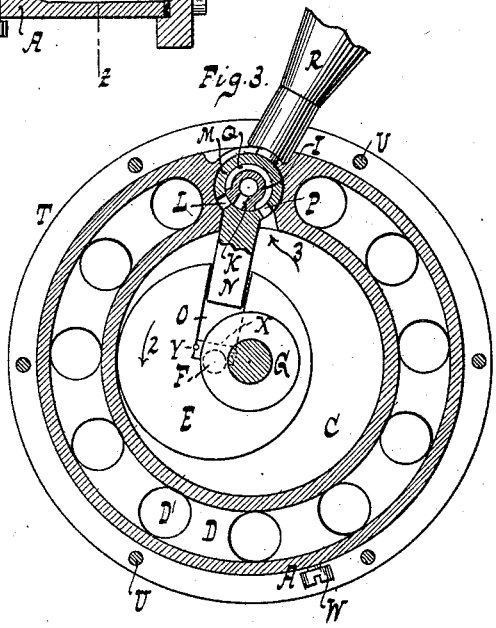


Fig. 3.



WITNESSES:

William L. Keller

Edward Wolff.

INVENTOR:

Emil F. Holmgreen

BY

Van Santvoord & Hauff

ATTORNEYS

(No Model.) 2 Sheets—Sheet 2.

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Fig. 4.

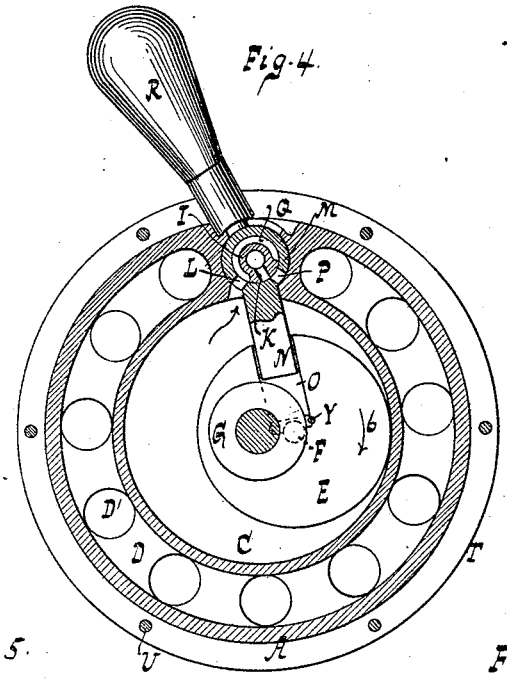


Fig. 5.

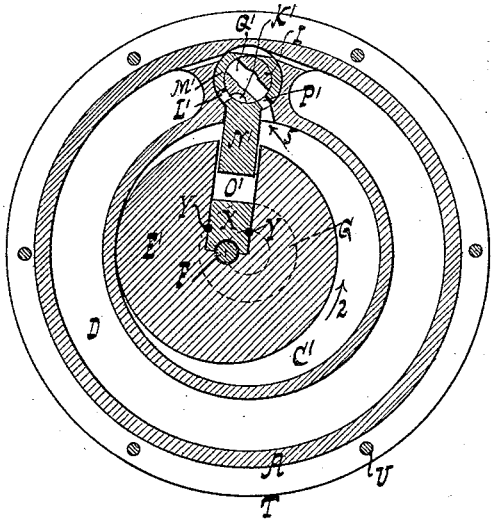


Fig. 6.

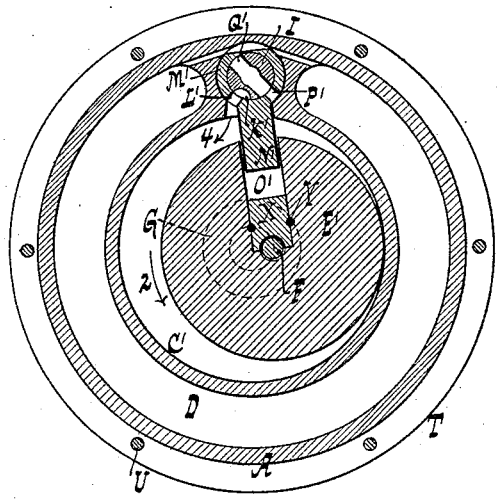
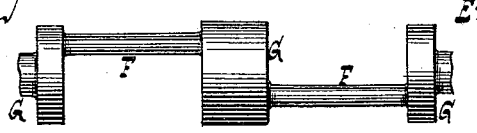


Fig. 7.



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UNITED STATES PATENT OFFICE.

EMIL F. HOLMGREEN, OF BROOKLYN, NEW YORK, ASSIGNOR OF ONE-HALF TO HUGH DE HAVEN, OF SAME PLACE.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 454,738, dated June 23, 1891.

Application filed March 26, 1891. Serial No. 386,460. (No model.)

To all whom it may concern:

Be it known that I, EMIL F. HOLMGREEN, a subject of the King of Sweden, residing at Brooklyn, in the county of Kings and State of New York, have invented new and useful Improvements in Rotary Engines, of which the following is a specification.

This invention relates to an improvement in rotary engines; and the invention consists in the details of construction set forth in the following specification and claims, and illustrated in the annexed drawings, in which—

Figure 1 is a longitudinal section of the engine along *x x*, Fig. 2. Fig. 2 is a section along *y y*, Fig. 1. Fig. 3 is a view similar to Fig. 2 with parts in a different position. Fig. 4 is a view similar to Fig. 2, the engine being reversed. Fig. 5 is a section along *z z*, Fig. 1. Fig. 6 is a view similar to Fig. 5 with parts in a different position, and Fig. 7 is a detail side view showing a modified construction of engine or crank shaft.

In the drawings, the letter A indicates a shell or casing having a partition B, which separates the chambers or cylinders C C'. The case A is shown as having a double wall, forming chambers D D, communicating with one another by holes or passages D', and when the chambers D and passages D' are filled with steam a jacket is formed for keeping the cylinders C C' warmed. In the cylinders C C' are the pistons E E', connected by eccentric or crank pins F with a rotary engine or crank shaft G, said crank-pins passing loosely through the pistons. The steam for driving the pistons enters through inlet H into a tube I, having an inlet-port K. From port K the steam passes through port L into the cylinder C, as indicated by arrow 1, Fig. 2. The port L is formed in a sleeve M, sitting loosely about tube I, and said sleeve has a rigid tongue or guide-piece N, sitting loosely in a slot O in piston E. The steam entering through ports K L forces the piston around in direction of arrow 2, Fig. 2, and when the parts have reached the position shown in Fig. 3 the sleeve M has been shifted by tongue N, so that the steam passes through port P, as indicated by arrow 3, Fig. 3, into the exhaust-channel Q in the tube I.

The exhaust-channel Q communicates with the inlet-port K', as seen in Fig. 1. When the parts are in the position shown in Fig. 6, the inlet-port K' communicates with the port L', so that the steam from said port K' passes through L' into chamber C', as indicated by arrow 4, Fig. 6. The inlet-port K' is formed in the tube I the same as the inlet-port K, and the port L' is formed in a sleeve M', sitting loosely about the tube I and having a tongue or guide-piece N', entering a slot O' in the piston E'. The steam entering, as indicated by arrow 4, forces the piston E' around in the direction of arrow 2, Fig. 6, which is the same direction taken by piston E, Fig. 2, so that the two pistons coact in rotating the shaft G by means of the crank-pins F. When the parts have reached the position indicated in Fig. 5, the sleeve M' has been shifted by tongue N', so that the steam passes through port P', as indicated by arrow 5, into the exhaust Q', which communicates with the outlet H'.

The ports in the tube I may be called the "main ports" and the ports in the sleeves M M' the "secondary ports." The tube I can be shifted by the attached handle R from the position shown in Fig. 2 to the position shown in Fig. 4, so as to reverse the engine, since in the case of Fig. 4 the port L, which formerly communicated or registered with the inlet-port K, now communicates or registers with the exhaust-port Q and the port P now acts as an inlet-port, so that the piston E is forced around in the direction of arrow 6, Fig. 4. As the shifting of the tube I to the position shown in Fig. 4 shifts not only the ports K Q, but also the ports K' Q', the motion of both pistons E and E' is reversed. By having two pistons E E' acting on the shaft G more power is gained than if only one piston were used, and by causing the steam to drive first one piston and then the other the energy of the steam is thoroughly utilized. One piston could, however, be made to serve, if desired. The rotation of shaft G can be communicated to a pulley S, adapted to receive a belt.

The ends of the casing A are shown closed by plates T, held in place by screws U and having suitable packings about the shaft G. A valve V can be used to admit steam to the spaces D D' to form a steam-jacket.

The sleeves M M′ are jointed or fitted snugly into suitable seats or recesses in the wall of cylinder or casing A, so that said sleeves are readily shifted by the oscillating tongues or guide-pieces N N′, and said tongues, by reason of their sliding connection with pistons E E′, not only shift the sleeves M M′, but also guide or hold the pistons in proper position.

The partition B is shown held in place by a screw W. The crank-pins F are conveniently set into the pistons by placing the pins into the slots O O′ and then onto said pins the retaining pieces or blocks X, secured by keys Y, as seen in Fig. 2.

Instead of having the crank-pins F arranged in alignment, as in Fig. 1, these crank-pins may be arranged out of alignment, as in Fig. 7.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with the shell or casing, the crank-shaft, and the piston having a slot, of an axially-turning tube having a steam-inlet, an oscillating sleeve loosely mounted on the tube and having an inlet and an exhaust, and a tongue or guide-piece rigid on the sleeve and engaging the slot in the piston, substantially as described.

2. The combination, with the shell or casing, the engine or crank shaft, and the slotted piston eccentrically connected with the shaft, of an axially-turning tube journaled in the cylinder and having a steam-inlet port, an oscillating sleeve loosely mounted on the tube and provided with an inlet-port and an exhaust-channel, and a tongue or guide piece rigid with the sleeve and engaging the slotted part of the piston, substantially as described.

3. The combination, with the shell or casing having a central partition dividing it into opposite chambers or cylinders, the engine or crank shaft, and the pair of slotted pistons arranged, respectively, at opposite sides of the partition and eccentrically connected with the engine or crank shaft, of the axially-turning tube journaled in the casing and having steam-inlet ports communicating, respectively, with the two chambers or cylinders, the oscillating sleeves loosely mounted on the tube and provided with steam-inlet ports and exhaust-channels, and a pair of tongue or guide pieces rigid with the sleeves and engaging the slotted portions of the pistons, substantially as described.

4. The combination, with the shell or casing, the engine or crank shaft, and the pistons having a slot and engaging the engine or crank shaft, of a retaining piece or block set in the slotted portion of the piston and bearing against the engine or crank shaft, the keys holding the said retaining piece or block in proper position, the axially-turning tube journaled in the shell or casing and provided with a steam-inlet port, the oscillating sleeve loosely mounted on the tube and provided with a steam-inlet port and an exhaust-channel, and a tongue or guide piece rigid with the sleeve and engaging the slotted portion of the piston, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

EMIL F. HOLMGREEN.

Witnesses:
WM. C. HAUFF,
E. F. KASTENHUBER.