No. 627,832. Patented June 27, 1899.

W. S. TICHENOR & J. F. WILLIAMS.

ROTARY ENGINE.

(No Model.) (Application filed Oct. 31, 1898.) 2 Sheets—Sheet 1.

Fig. 1.

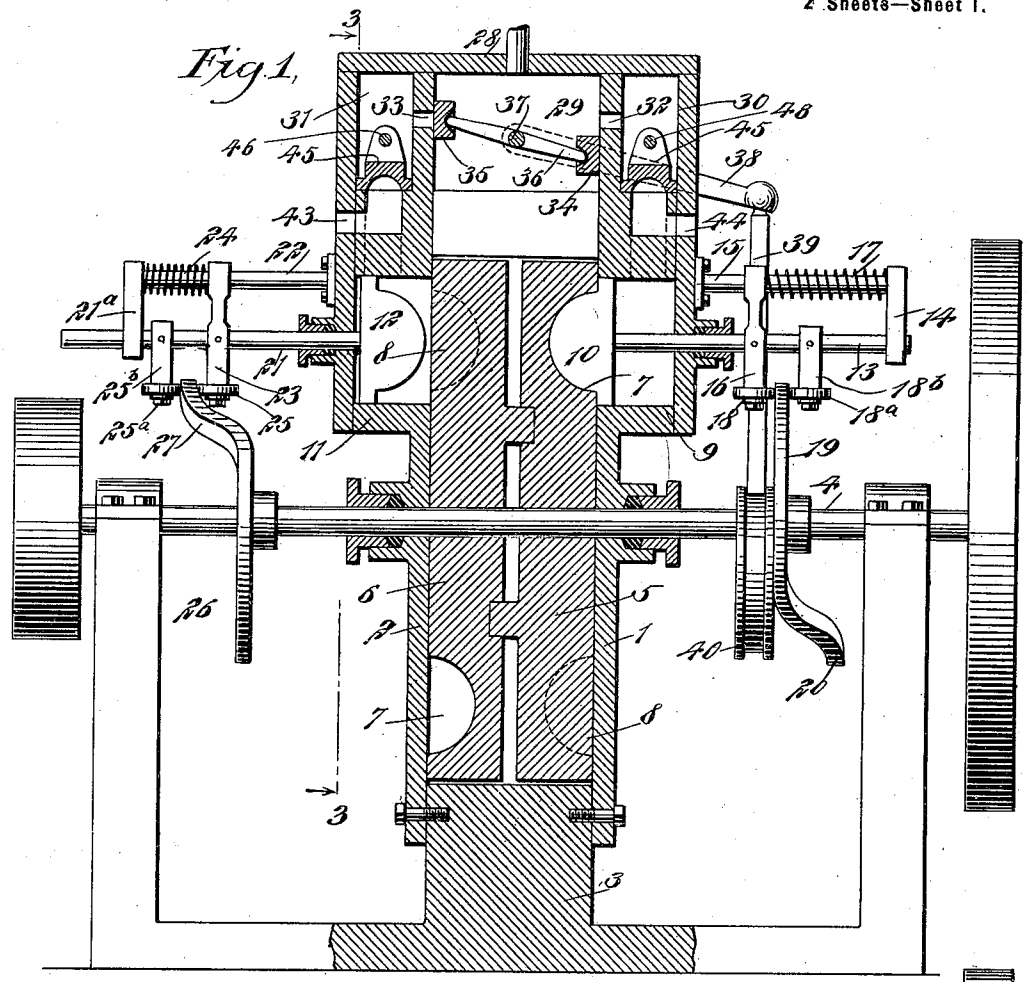
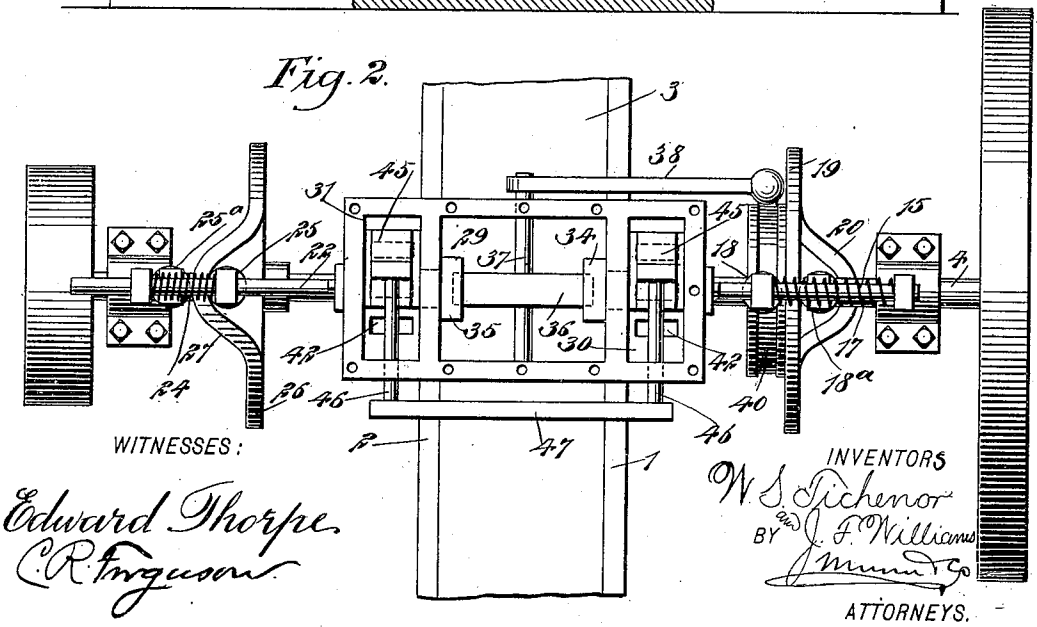


Fig. 2.



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Fig. 3.

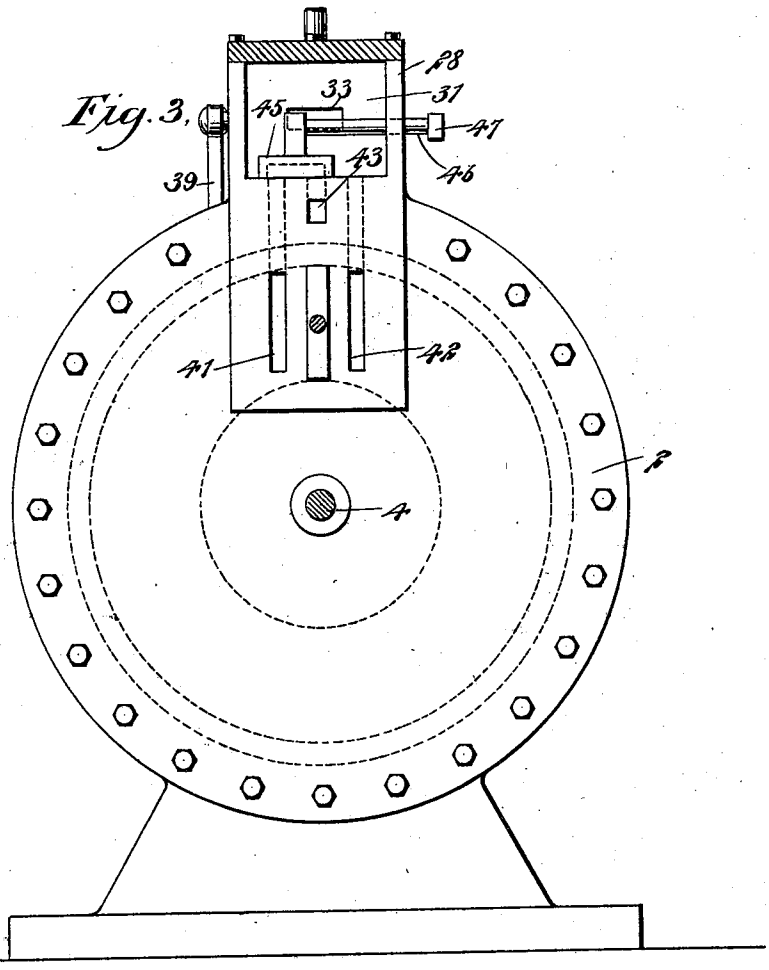
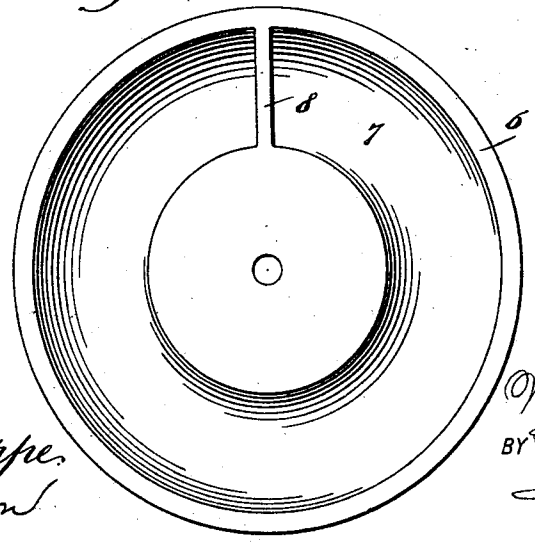


Fig. 4.



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UNITED STATES PATENT OFFICE.

WILLIAM S. TICHENOR AND JAMES F. WILLIAMS, OF OWENSVILLE, INDIANA.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 627,832, dated June 27, 1899.

Application filed October 31, 1898. Serial No. 695,080. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM S. TICHENOR and JAMES F. WILLIAMS, of Owensville, in the county of Gibson and State of Indiana, have invented a new and Improved Rotary Engine, of which the following is a full, clear, and exact description.

This invention relates to improvements in rotary engines; and the object is to provide an engine of this character of very simple construction and having very few parts, and therefore not liable to get out of order.

We will describe a rotary engine embodying our invention and then point out the novel features in the appended claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a sectional elevation of a rotary engine embodying our invention. Fig. 2 is a plan view with the top of the steam-chest removed. Fig. 3 is a partial elevation and partial section on the line 3 3 of Fig. 1, and Fig. 4 is a side view of one of the pistons.

Referring to the drawings, 1 2 designate the cylinder-heads, secured to an annulus 3, which forms the side wall of the cylinder. Extended through the cylinder and having bearing in the cylinder-heads is a driving-shaft 4, upon which the pistons 5 6 are mounted and also on which fly and band wheels are mounted. Preferably one of these pistons will be rigidly mounted on the shaft. The other one, however, may be mounted so as to have a slight movement longitudinally of the shaft, so that steam entered between the two pistons will cause their outer faces to engage closely against the cylinder-heads. Each piston is provided in its outer face with an annular channel 7, which is semicylindrical in cross-section and has at one end an abutment 8. The pistons will be so arranged on the shaft that the abutments will be on opposite sides of the shaft.

The cylinder-head 1 has a chambered offset 9, in which an abutment-blade 10 is designed to move at a certain time. This abutment-blade corresponds in shape to the cross-section of the channel of the piston 5 and is adapted to engage therein, as will hereinafter appear. The cylinder-head 2 is also provided with a recessed offset 11, in which an abutment-blade 12 is designed to move, this abutment-blade 12 being also designed to pass into the channel 7 of the piston 6. The abutment-blade 10 has a stem 13, extended outward through the cylinder and movable through a guide 14, depending from a rod 15, extended from the cylinder.

Connected with the stem 13 is an arm 16, which has an opening in its upper end through which the rod 15 passes, so that said arm may be moved longitudinally of the rod against the resistance of a spring 17, arranged between the arm 16 and the guide 14. On the lower end of the arm 16 is a roller 18, normally engaging with one side of a cam-wheel 19, mounted on the shaft 4 and having an outwardly-projected cam 20 at one side. A roller 18^a on a hanger 18^b bears against the other side of the wheel. By this construction a quick motion will be given to the blade 10.

From the abutment-blade 12 a stem 21 extends outward through the cylinder and is movable through a guide 21^a, depending from a rod 22, extended from the cylinder, and rigidly connected with the stem 21 is an arm 23, having an opening at its top or upper portion, through which the rod 22 passes loosely, so that said arm 23 may be moved longitudinally of the rod against the resistance of a spring 24, arranged between the arm and the guide 21^a. Mounted on the lower end of the arm 23 is a roller 25, engaging with one side of a cam-wheel 26 on the shaft 4 and having a cam projection 27 on its outer side. A roller 25^a on a hanger 25^b engages the other side of the cam-wheel.

On the top of the cylinder is a steam-chest 28, having a main steam-chamber 29 and two auxiliary side chambers 30 and 31, connecting, respectively, with the chamber 29 through ports 32 33. These ports are controlled by slide-valves 34 35, carried on the projected arms of a rocker-head 36, the shaft 37 of which extends outward through a side wall of the steam-chest and has connection through the medium of an arm 38 with an eccentric-rod 39, the lower end of which has a strap engaging with the eccentric 40 on the shaft 4. The steam-chamber 31 has port connections 41 42

with the chamber in the offset 11, and it has an exhaust-port 43, providing communication between said chambers. The chamber 30 has an exhaust-port 44, and it also has inlet-ports communicating with the chamber in the offset 9, similar to the ports 41 and 42.

Arranged in each chamber 30 31 is a reversing-valve 45, adapted to be moved to place the port 41 in connection with the exhaust-port or the port 42 in connection with the exhaust-port, depending, of course, upon the direction desired to rotate the pistons. These reversing-valves have stems 46, extended outward through a wall of the steam-chest and connected with a cross-bar 47.

In operation, the cam projections 20 and 27 being so arranged that the abutment-blades 10 and 12 alternately move outward, and as the valves 34 35 are rocked to simultaneously open and cut off the ports 32 33, steam will enter from the main chest into the auxiliary chambers 30 and 31 and live steam will pass downward through the port 42, as the drawings disclose. The steam by abutting against the abutments will cause the pistons to rotate, consequently rotating the shaft. On each half-rotation of the piston one or the other of the abutment-blades 10 12 will be moved outward to allow the abutment 8 to pass. The exhaust-steam will pass up through the port 41 and out through the exhaust-port 43. After an abutment 8 shall have passed its abutment-blade the said abutment-blade will be moved inward or into the channel by its spring.

Having thus described our invention, we claim as new and desire to secure by Letters Patent—

1. A rotary engine, comprising a cylinder, a shaft extended through the cylinder, two pistons on the shaft, one of said pistons being rigidly connected to the shaft and the other movable longitudinally of the shaft, said piston being provided with an annular channel in its outer face, an abutment in each channel, abutment-blades movable into said channel and means for moving the blades, substantially as specified.

2. A rotary engine, comprising a cylinder, a main shaft extended through the cylinder, two pistons mounted on the shaft, one of said pistons being rigidly connected with the shaft and the other movable longitudinally thereof, each piston being provided at its outer face with an annular channel, an abutment in each channel, abutment-blades movable into said channels and also into recesses formed in offsets formed on the cylinder, cam-wheels carried by the shaft for moving said abutment-blades outward, means for moving the abutment-blades inward, and means for controlling the admission and exhaust of steam, substantially as specified.

3. In a rotary engine, a cylinder, a piston arranged in the cylinder, a steam-chest on the cylinder and comprising a main chamber and two auxiliary chambers, a rock-shaft extended through the main chamber, arms extended from said shaft, valves on said arms for controlling ports between the main chamber and the auxiliary chambers, means for operating the rock-shaft, and reversing-valves in the auxiliary chambers, substantially as specified.

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