(No Model.) 3 Sheets—Sheet 1.

J. L. ROWAN.

ROTARY STEAM ENGINE.

No. 478,240. Patented July 5, 1892.

Fig. 1.

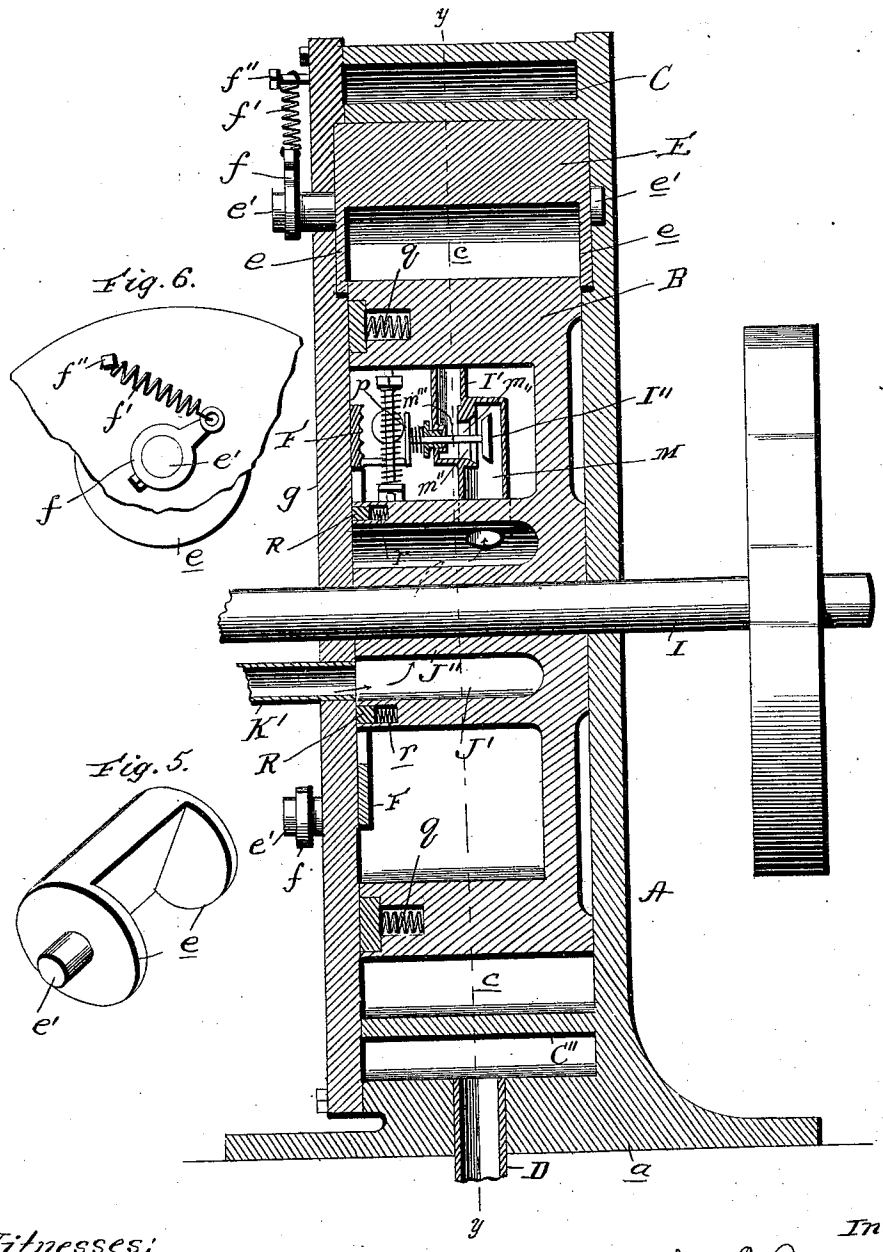

Fig. 6.

Fig. 5.

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Fig. 2.

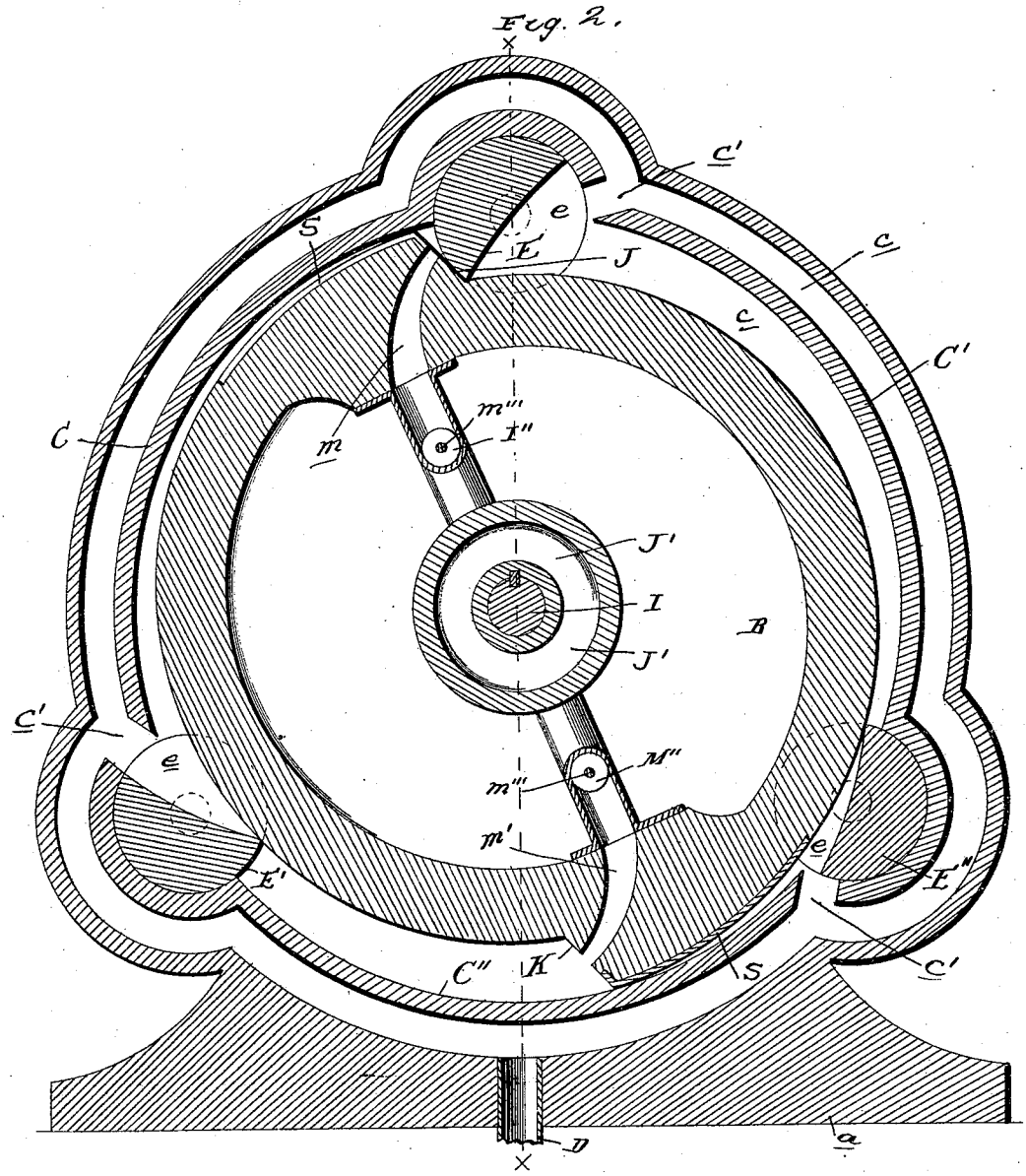

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Fig. 3.

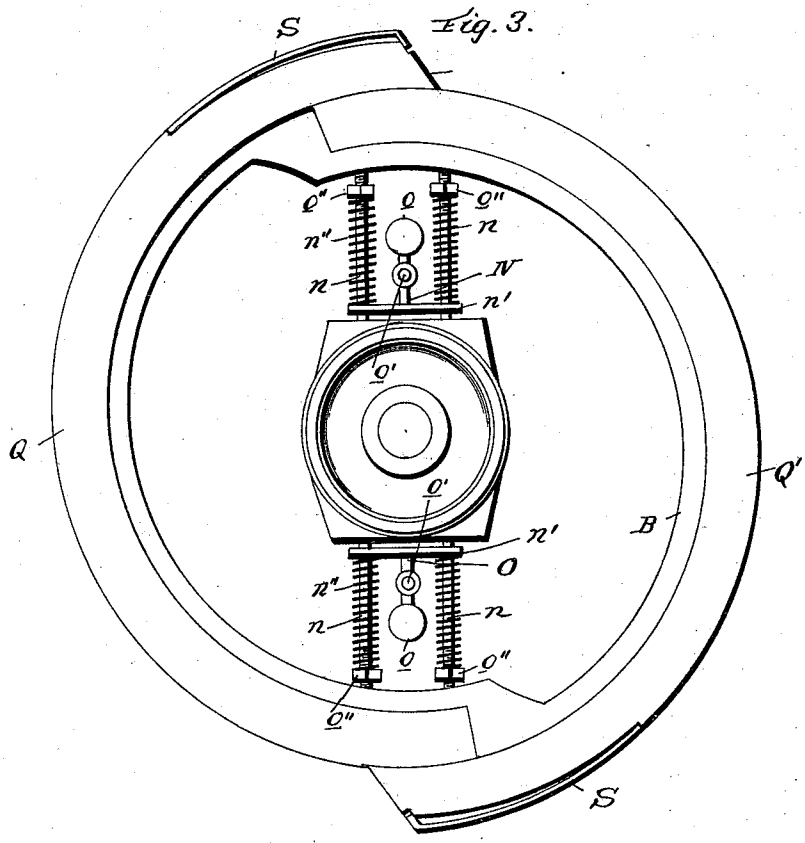
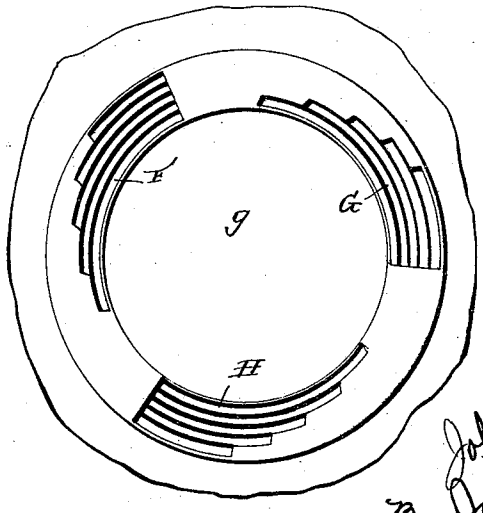


Fig. 4.



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UNITED STATES PATENT OFFICE.

JOHN LOUIS ROWAN, OF JOPLIN, MISSOURI.

ROTARY STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 478,240, dated July 5, 1892.

Application filed October 7, 1891. Serial No. 408,018. (No model.)

To all whom it may concern:

Be it known that I, JOHN LOUIS ROWAN, a citizen of the United States, residing at Joplin, in the county of Jasper and State of Missouri, have invented certain new and useful Improvements in Rotary Steam-Engines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in rotary steam-engines; and the objects are, first, to simplify the construction; secondly, to regulate and control the speed of the piston and overcome the dead-center; third, effect economy in the use of steam by utilizing the full pressure or "head" when admitting steam, instantly cut off the pressure at a portion of the stroke or revolution of the piston, and permitting the steam to expand before exhausting it, and to balance the parts or maintain them nearly in equlibrium, so that superior speed regulation is effected and the resistance reduced to a minimum.

With these ends in view the invention consists of the novel combinations of devices and peculiar constructions and arrangement of parts, which will be hereinafter fully described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a vertical sectional view of my rotary engine on the plane indicated by the dotted line *x x* of Fig. 2. Fig. 2 is a sectional view in a plane at right angles to Fig. 1 and in the dotted line *y y* of said figure. Fig. 3 is a sectional view of the rotary concentric piston, showing the regulator mechanism in elevation. Fig. 4 is a detail view of one of the face-plates of the fixed cylinder, showing the inner surface of the same and three sets of grooved ridges or ribs, each of variable length for the controlling-pins of the inlet-valve to ride against. Fig. 5 is a detail perspective view of one of the rocking abutments or heads against which the steam presses or forces, and Fig. 6 is a detail view showing the means for holding a rocking abutment or head in position to ride or impinge against the periphery of the concentric rotary piston.

Like letters denote corresponding parts in the several figures of the drawings.

As is usual in this class of steam-engines, I employ a fixed or rigid cylinder A and a concentric piston B, arranged within the cylinder and free to revolve therein under the pressure and expansive force of the steam admitted thereto. The cylinder A is secured to a base-foundation *a* in the usual way, and on the inside of the cylinder I provide the partitions or walls C, C′, and C″, which are arranged concentric with the cylinder and within the same to provide the passages *c* for the exhaust-steam, an exhaust-pipe D connecting with the exhaust-steam passage to convey the steam away. At equidistant points at the terminals of the walls C C′ C″ are the exhaust-ports *c′*, and in these ports are the rocking abutments or heads E E′ E″, arranged to span the exhaust-ports and to close the same, so as to prevent the live steam from entering the exhaust-ports. Each abutment is segmental on one side and flat or nearly flat on the other, and the abutment is provided with ears or flanges *e*, arranged to lap against the sides or lateral faces of the rotary piston B, said abutment being further provided with trunnions *e′*, which are fitted in sockets in the cylinder A in a manner to permit the abutment to rock or oscillate. One of the trunnions of each abutment has a tappet-arm *f* rigidly secured thereto on the outside of the cylinder, and to this tappet is connected one end of a spring *f′*, which is fastened at its other end to a bolt or pin *f″*, and which serves to turn the oscillating abutment into such position that its inner edge always rides or impinges against the periphery of the rotary piston. One of the face-plates *g* of the cylinder is provided with three sets of ridges or ways F G H, located in juxtaposition to the rocking abutments, and each set of ways or grooves consists of a series of three or four (more or less) ways which are concentric with each other and of variable length, the inner way being the largest, the second way being the next largest, and so on throughout the series, for a purpose to be explained. The concentric rotary piston B is fitted snugly in the cylinder, and it is carried by or mounted in a horizontal shaft I, which is journaled in suitable bearings. The piston is formed on its periphery with offsets J K at diametrically-opposite points, and which face in opposite directions, the periphery of the piston from

the offsets being concentric to the shaft or axis of the cylinder. In the center of this piston I provide a transverse steam-chamber J′, which extends part way through the piston, and in this steam-chamber is arranged the sleeve J″, which is integral with the piston, and through which sleeve passes the shaft I, the piston being rigidly fastened to the shaft in any suitable way. The steam-chamber in the piston is concentric with the shaft, and live steam is constantly supplied thereto through an inlet-pipe K′, which extends through the full face *g*, quite close to the shaft I, and so that its inner end discharges into the steam-chamber. From this chamber J′ lead the passages or pipes *l*, which discharge into the valved controlling-chambers I′ M, formed in the piston on opposite sides of the central chamber. From the valved controlling-chambers lead the passages *m m′*, which open through the offsets in the periphery of the piston, and the controlling-chambers have continuous and uninterrupted communication with the central steam-chamber; but the outlet of steam from the controlling-chamber to the offsets is controlled by means of the valves I″ M″, located in the chambers, as shown in Fig. 2. These valves may be of any form desired; but I prefer to employ puppet-valves because they close instantly when the steam is shut off and effect a steam-tight joint with the seats, said valves having the seats *m″* and the valve-stems *m‴*, the latter being extended through packed stuffing-boxes in one end of the steam-chamber to be controlled or operated by the regulators N O, one of which is provided for each valved controlling-chamber. The valves are normally forced to their seats by springs or equivalent devices, and when it is desired to permit steam to pass to the offsets and act against the rocking abutment the valve is instantly opened by the following device forming the regulator.

Each regulator consists of two stems or bars *n n*, a sliding cross-head *n′*, the tension-springs *n″*, the ball or weight *o*, and the pin *o′*. The guide stems or bars *n n* lie radially to the piston and are secured thereto in any suitable way, and on these guide-stems is fixed the cross-head *n′*, which can slide on the pins under the centrifugal force of the ball or weight when it is sufficient to compress the springs, the latter encircling the guide-stems and bearing against the cross-head. Nuts *o″* are screwed in the outer ends of the guide-stems to keep the springs in place, and said nuts can be adjusted to compress the springs and vary the tension thereof, whereby the springs can be controlled to regulate the outward play of the balls or weights and control the speed of the engine. The balls or weights are rigid with and carried by the movable cross-heads between the guide-stems and springs, and the pins *o′* are fitted in the shanks of the balls or weights, so as to slide or move a limited distance. The movable actuating-pin *o′* of each regulator is arranged to ride upon one of the concentric ways of each set of ways, and when it comes in contact with the way the pin is moved inward and contacts with a full plate *p* on the outer end of the valve-stem *m‴*, thus forcing the latter inward and opening the valve in the controlling-chamber. It will be seen that during each revolution of the piston the movable pin of each regulator will contact once with one way of the three sets of ways, and thus the valve will be opened and closed three times during each revolution, and the way or groove of each set that the pin rides upon depends upon the rate of speed of the piston, for if the piston is moving at a speed in excess of the rate to which the engine is adjusted to run centrifugal force will throw the balls or weights outwardly, thus moving the cross-heads away from the center and thereby the movable contact-pin, which is thus caused to ride upon one of the shorter ways, the result of which is that the valves are reopened for a shorter time and less steam is permitted to pass through the controlling-chambers to the ports at the offsets of the cylinder.

The piston is packed in the cylinder by means of the face-packing segments Q Q′, arranged in grooves in the piston and overlapping each other at the ends, (see Fig. 3,) and the rings are forced against the face-plate *g* by the spiral springs *q*. A similar face-packing R is arranged around the central steam-chamber and forced against the face-plate by the springs *r*. At the periphery of the piston, in juxtaposition to the offsets, are the peripheral springs S S, one end of each of which is fastened to the piston, and the other end laps over the offset.

In operation the oscillating abutments are normally pressed against the periphery of the piston, and as the latter rotates the abutment drops into one offset and the valve is opened suddenly by the regulator to admit the full head of the steam against the abutment, the valve being held open a limited time, according to the speed, and then being suddenly closed to permit the steam to expand, one of the other valves being open to exhaust and the other being closed. The operation is repeated at each rocking abutment and the piston is driven continuously.

I am aware that modifications in the form and proportion of parts and details of construction can be made without departing from the spirit of my invention.

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

1. In a rotary engine, the combination, with the exhaust-passages and the rocking abutments, of the piston having the offsets, the central steam-chamber, and the valved controlling-chambers, the face-plate having the series of ways of different lengths, and the weighted spring-controlled pins adapted to open the valves and to ride upon the ways, substantially as described.

2. In a rotary engine, the combination, with the exhaust-passages and the rocking abutments, of the set of concentric variable ways in juxtaposition to each abutment, the piston having the central steam-chamber and the valve dcontrolling-chambers, and the centrifugal regulator carried by the piston and arranged to ride upon the ways and open the valve for a period of time in accordance to the rate of speed of the piston, substantially as described.

3. In a rotary engine, the combination, with the exhaust-passages and the rocking abutments, of the concentric variable ways arranged in series at each abutment, the piston having the central steam-chamber and the valved controlling-chambers connected thereto, the sliding cross-heads carried by the piston and each having a centrifugal ball or weight acting against tension-springs, and the movable pins in the cross-heads arranged to ride on the ways and open the valves in the controlling-chambers, substantially as described.

4. In a rotary engine, the casing having the exhaust-passages, combined with the pivoted abutments, each having a spring-controlled tappet, the rotary piston packed within the cylinder and having the offsets and the valved controlling-chambers situated between a central steam-supply and the discharge-port at the offsets, the variable concentric ways rigid with the cylinder at each abutment, the radial guide stems or rods, the springs, the sliding cross-heads having the centrifugal balls, and the movable valve-pins carried by the cross-heads, substantially as described.

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

JOHN LOUIS ROWAN.

Witnesses:
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S. G. FENN.