(No Model.) 2 Sheets—Sheet 1.

W. G. ADAMS.

ROTARY ENGINE.

No. 456,351. Patented July 21, 1891.

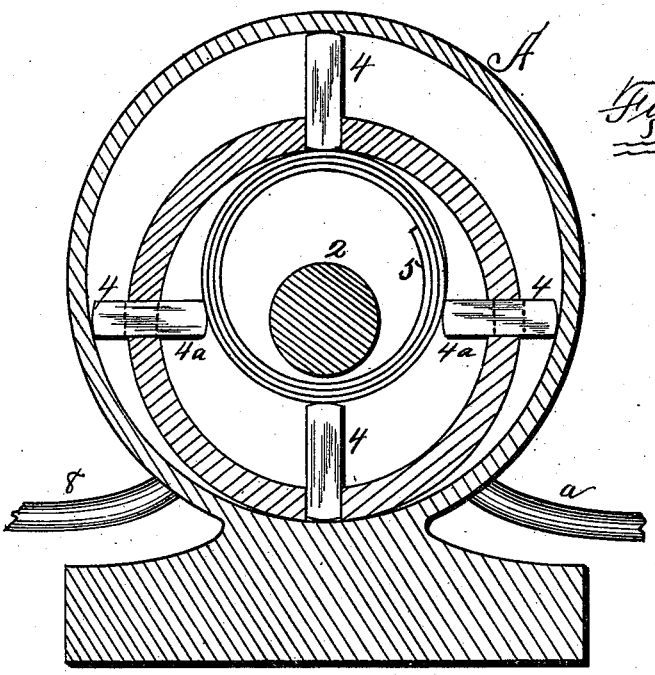

Fig. 1.

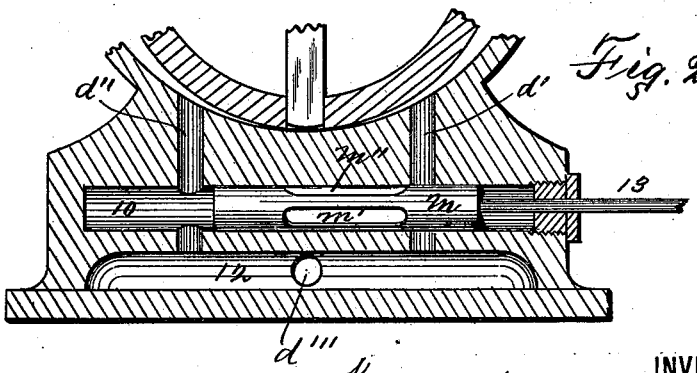

Fig. 2.

WITNESSES:
H. A. Carhart
C. B. Kinne.

INVENTOR
Willard G. Adams

BY
Smith & Dowson
his ATTORNEYS

(No Model.) 2 Sheets—Sheet 2.

W. G. ADAMS.

ROTARY ENGINE.

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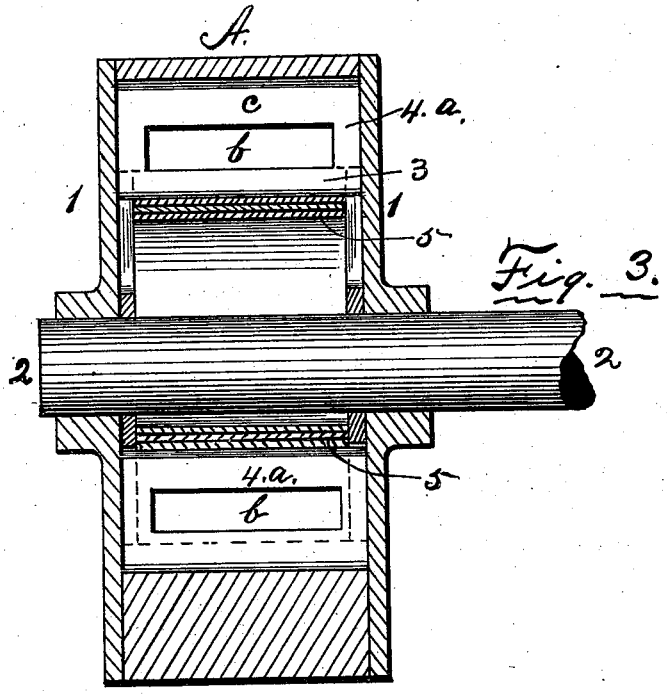

Fig. 3.

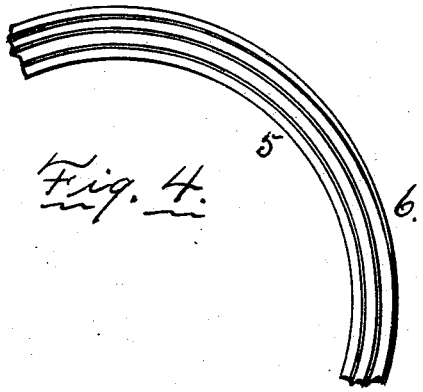

Fig. 4.

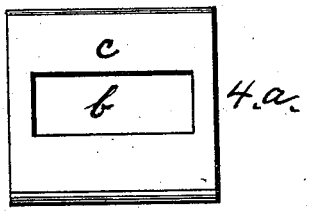

Fig. 5.

WITNESSES:
H. A. Carhart.
C. B. Kinne

Willard G. Adams INVENTOR

BY
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his ATTORNEYS

UNITED STATES PATENT OFFICE.

WILLARD G. ADAMS, OF WEEDSPORT, NEW YORK.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 456,351, dated July 21, 1891.

Application filed April 20, 1891. Serial No. 389,604. (No model.)

To all whom it may concern:

Be it known that I, WILLARD G. ADAMS, of Weedsport, in the county of Cayuga, in the State of New York, have invented new and useful Improvements in Rotary Engines, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My invention relates to rotary engines in which an inner rotary cylinder or drum is arranged eccentrically within the outer cylinder or casing and is provided with pistons adapted to reciprocate in their respective seats in said cylinder, which pistons bear outwardly against the inner surface of the casing to make a water or steam tight joint and inwardly against elastic loose rings which force the pistons outward.

My object is to so improve the internal construction that the pistons will always make a steam or water tight joint with the inner surface of the casing, and will always be forced outward toward and held against it by the spring action of loose elastic coil-springs which form the eccentric within the inner rotating cylinder which carries the pistons and are not attached to anything, said loose rings being always carried or supported by the pistons in their position eccentric to the inner cylinder and concentric to the casing in which part of the pistons are slotted, so that for a part of the time they operate in the ordinary way and then permit the steam to pass through the slots expansively, in which both edges of the pistons are rounded, so that they can rock upon the eccentric spring-ring as they are carried around with the inner cylinder.

My invention consists in the several novel features of construction and operation hereinafter described, and which are specifically set forth in the claims hereunto annexed. It is constructed as follows, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical section transverse to the casing, the inner cylinder, and the shaft, and showing one of the loose coiled-spring eccentric rings and the pistons in elevation. Fig. 2 is a vertical section of part of the casing and inner cylinder and the base, and showing a reversing-valve located in said base and the parts connected with the steam-chamber. Fig. 3 is a vertical section longitudinal to the casing of the construction shown in Fig. 1, and showing the port-pistons in plan. Fig. 4 is an enlarged detail of a part of my loose spring-coil eccentric. Fig. 5 is a plan of my piston provided with a port through the body.

A is the outer cylindrical casing, closed at the ends by removable heads 1, which are plane upon their inner faces. The shaft 2 is inserted through the heads through shaft-holes, which are eccentric to the casing.

Upon the shaft within the casing I secure the piston-head 3, which fits closely against the inner faces of the heads 1, and its lower side is contiguous to the inner face of the casing. In this head seats are cut upon a radial line, which closely receive the pistons 4, which are equidistant from each other. The outer edges of these pistons bear against the inner wall or face of the casing, and their inner ends bear upon and are held in contact with the casing by means of the ring 5. This ring, as shown in Figs. 1 and 4, consists of a strip of spring sheet metal loosely and helically wound, so that its tendency is to uncoil and thus expand, and it is inserted within the inner edges of the pistons and then permitted to expand against them, so that it bears with a spring-tension against them at all times, supporting the pistons and holding them in close contact with the casing. There is such a ring at each end of the pistons. These rings are not secured to the heads of the casing nor to anything, but simply lie against the heads and are gripped between the pistons. The outermost end of the strip of spring metal is scarfed off, as at 6, so that when wound the outer face of the ring will form substantially a circle and be free from any jog or shoulder to prevent the free rotating travel of the rings within the pistons.

The pistons marked 4^a in the drawings are constructed with an opening or port *b* through them, leaving a rim *c* across and constituting the outer edge of the piston. As the steam enters the casing through the inlet-pipe *d* it exerts its force against the piston, causing the head to rotate, and when the piston, as 4^a, on the right in Fig. 1 has been carried to substantially the position there shown, then the

port *b* therein opens and the steam passes through it into the chamber in front of it and expansively exerts its force upon the upper piston 4. Thus the port-pistons alternately take steam and open as above described, so that the steam operates expansively, and there are only two exhausts through the exhaust-pipe 8, although there are four pistons. Furthermore, these pistons are so disposed that they balance the spring-ring between them; also, the pistons are free to rock upon the rings, as indicated by the positions of the pistons 4^a in Fig. 1.

The reversing-valve mechanism shown in Fig. 2, which can also be applied to Fig 1, is contained within the base, and consists of a cylindrical valve-chamber 10, a tubular valve *m*, mounted therein, and ports *d'* and *d''*, intersecting the valve-chamber and opening down into the exhaust-chamber 12, and the pipe *d'''* carries off the exhaust. The valve is tubular with closed ends, with a side steam-inlet port *m'*, with a top steam-outlet port *m''*, and a stem 13. The steam is let into the valve-port *m'* through a pipe through the base, (not shown,) but at about the center of the length of the valve, as shown in Fig. 2, where the steam is entirely shut off from the steam-chamber in the casing. Then when the valve is drawn out to the right, the steam is admitted through the ports *m'* and *d'* into one side of the casing; or when the valve is pushed in the steam passes through the ports *m''* and *d''* into the other side of the casing.

It will be seen that my coiled spring-ring is always positive in its action, will always take up the wear, and keep the pistons steam-tight; that such action will always be quick on account of the resiliency of the spring and always positive, and they will always hold the pistons in a peculiarly light and perfect touch contact, giving a tight joint, with a minimum of friction even when the engine is running at the highest speed, so that my engine is always efficient and durable.

I am aware that loose solid rings, and also loose rings cut transversely like piston-packing rings, have been heretofore used; but neither of these is my invention, because neither of them possesses the properties nor can perform the peculiar functions of my loose coiled spring.

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

1. In a rotary engine, the combination, with the sliding pistons, of the loose and helically-wound eccentric rings of spring metal supporting the pistons and bearing against their inner edges.

2. The combination, with the casing and the piston-head therein, of the solid and slotted pistons mounted alternately in the head.

3. The combination, with the casing and the piston-head therein, of the solid and the slotted pistons mounted alternately in the head and the loose eccentric rings within the head engaging with the inner edges of the pistons.

4. The combination, with the casing and the piston-head therein, of the solid and the slotted pistons mounted alternately and the loose and elastic spring-rings supporting the pistons within the head and engaging with the inner edges of the pistons.

In witness whereof I have hereunto set my hand this 17th day of April, 1891.

WILLARD G. ADAMS.

In presence of—
C. C. ADAMS,
ISAAC CHADDERDON.