E. B. Adams, R. P. Trimble & H. N. Adams,

Rotary Steam Engine.

No. 46,201. Patented Feb. 7, 1865.

Fig. 1.

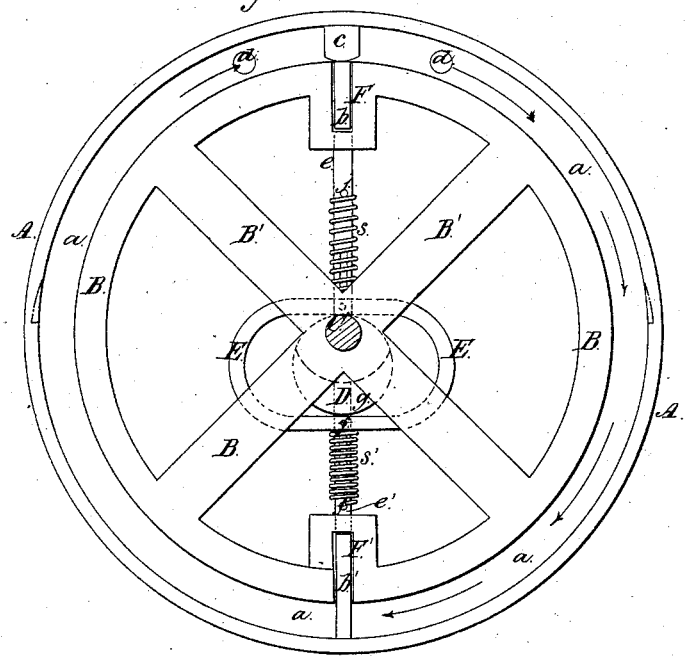


Fig. 3.

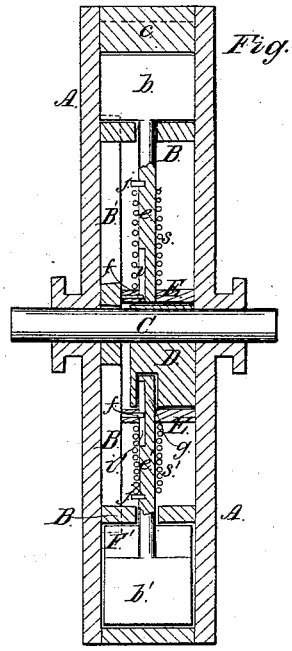
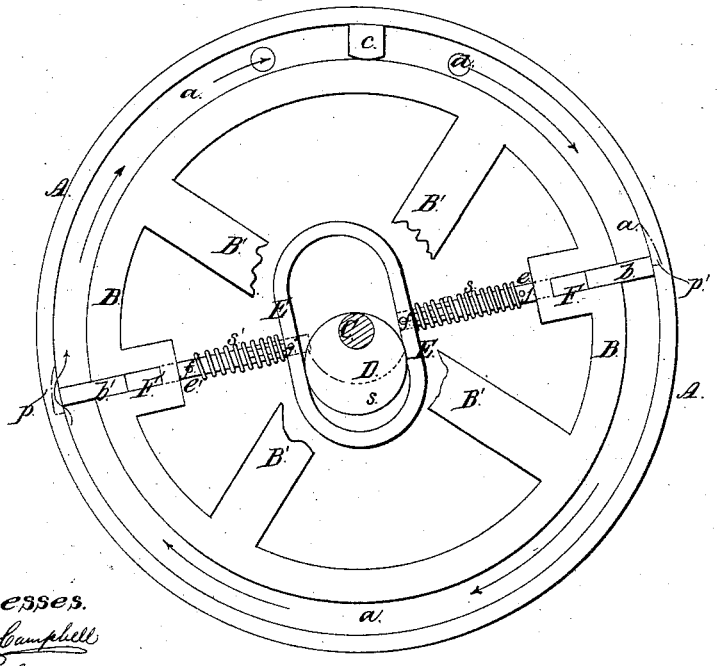


Fig. 2.



Witnesses.
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UNITED STATES PATENT OFFICE.

EDGAR B. ADAMS, ROBERT P. TRIMBLE, AND HORATIO N. ADAMS, OF SALEM, OHIO.

IMPROVEMENT IN ROTARY ENGINES.

Specification forming part of Letters Patent No. **46,201**, dated February 7, 1865.

To all whom it may concern:

Be it known that we, EDGAR B. ADAMS, ROBERT P. TRIMBLE, and HORATIO N. ADAMS, of Salem, county of Columbiana, and State of Ohio, have invented a new and Improved Rotary Steam-Engine; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a view of the interior of our engine. Fig. 2 represents the pistons and the parts immediately connected therewith, in a different position to that shown in Fig. 1. Fig. 3 is a diametrical section through Fig. 1.

Similar letters of reference indicate corresponding parts in the three figures.

This invention relates to that class of rotary engines which have radially-sliding plates or pistons revolving around a center and working in an annular space that is formed by the steam-chest and a rotating ring. The pistons, being acted upon by steam, cause said ring to rotate, and this ring in turn acts indirectly upon the pistons and alternately retracts them at the proper time to allow the steam to exhaust.

Our invention consists in a novel contrivance for alternately thrusting out and retracting the pistons, and for sustaining the inner ends of the piston-rods during the action of the steam upon their pistons, as will be hereinafter described.

In the accompanying drawings, A represents a narrow cylindrical steam chest or case for containing the steam-pistons and parts which control the operation of the same.

B represents a ring, which is of less diameter than the interior diameter of the case A. This ring is connected by radial arms B′ B′ to a central shaft, C, which passes steam-tight through the heads of the case A. The ring B, and also the cylinder of the case A, are concentric with the axis of the shaft C, and an annular space, *a*, is formed between the circumference of said ring and the circumference of the case A, within which the pistons *b b′* work steam-tight. This annular steam-space is interrupted at *c* by a division, which prevents the steam entering at *d* from escaping backward, and for this purpose this division-plate should fit snugly in contact with the circumference of the ring B, but not sufficiently tight to prevent this ring from freely rotating.

D is a cylindrical hub, which is secured rigidly to or formed on one of the heads of case A, so as to form an eccentric, it being out of the center of this case. This eccentric D receives an elongated yoke, E, having semicircular ends, the interior width of which is equal to the diameter of the eccentric, as shown in Figs. 1 and 2.

F F′ represent two recesses which are formed in the periphery of the ring B, diametrically opposite each other, and adapted for receiving within them the sliding piston-plates *b b′*, as shown in Figs. 1, 2, and 3. To the inner edges of the plates *b b′* piston-rods *e e′* are applied, which pass through the back ends of the piston-boxes and through the sides of the yoke E, to which latter said rods are attached by pins *f f* that project from the yoke and enter longitudinal grooves formed in the piston-rods, as indicated at *i i′*, Figs. 1, 2, and 3. Between the yoke and pins *j j′* we interpose helical springs *s s′*, which surround their respective piston-rods and act upon them through the medium of the yoke E, as will be hereinafter described, so as to keep the outer ends of the pistons in forcible contact with the inside surface of the cylindrical shell of case A.

As the steam acts upon the pistons and forces the ring B around, the yoke E is carried around the eccentric D, which causes this yoke to move back and forth from and toward the axis of the shaft C. As one side of the yoke recedes from the axis of the shaft C, it carries with it one of the pistons, and when this side of the yoke is nearest the said shaft it will have completely retracted its piston within the circumference of the ring B, at which moment the piston will pass under the division-plate *c*. As the opposite piston arrives at this point it is also drawn within the ring B, as above described.

Now, as it is not desired to cut off the steam from one piston-plate immediately the other piston-plate passes the division *c*, this latter is not thrust out fully until the pistons are in the position represented in Fig. 2. The yoke E gradually retracts the pistons and allows the springs *s s′* to force them outward, to be acted upon by the steam entering at D.

In Fig. 3 we have represented a slot, *g*, cut

into the eccentric D, for the purpose of receiving the inner ends of the piston rods as they are respectively brought into the positions represented in Figs. 1 and 3, and then leave this position, as indicated in Fig. 2. The form of this slot is represented by the dotted lines in Figs. 1 and 2, and it will be seen that during the whole time that the steam is acting upon a piston its piston-rod will be sustained at the inner end by the sides of said slot; and while it is true that the slot *g* is necessary to allow the yoke E to slide toward one of the pistons and the piston-rods to revolve around the eccentric D, it is important to sustain the inner ends of these pistons-rods at certain times during their revolution, and the slot *g* answers this end.

The operation of our engine is as follows: Steam is allowed to enter the annular space *a* through the port *d*, as indicated by the course of the red arrows in Figs. 1 and 2, and to act upon the piston *b'*, Fig. 1. This piston, together with the ring B, piston *b*, and eccentric yoke E, are moved around until the piston *b* is completely thrust out and the steam is thus cut off from the piston *b'*, at which moment the steam which is between the two pistons will escape through a groove, *p*, (indicated in red in Fig. 2,) and exhaust through the port *d'*. The steam will now act upon the piston *b* until the piston *b'* is carried past the division *c* and thrust out so as to cut off the steam from the piston *b*, when the dead steam will exhaust as before through the port *d'*. By thus bringing the pistons alternately into action, the steam is caused to rotate the shaft C. By reversing the action of the steam and allowing it to enter the port *d'* and exhaust through port *d*, the motion of the engine can at any moment be reversed, whatever may be the position of the pistons with respect to the ports. When the engine is thus reversed, the steam is allowed to exhaust through the groove *p'*, which is diametrically opposite the groove *p*.

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

1. The combination of an eccentric hub, D, having a groove, *g*, formed in it, with the revolving ring B, elongated yoke E, and sliding pistons *b b'*, operating substantially as described.

2. The application of springs *s s'* to piston-rods *e e'*, which are connected to a yoke, E, by means of pins *f f* working in slots *i i*, substantially as described.

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