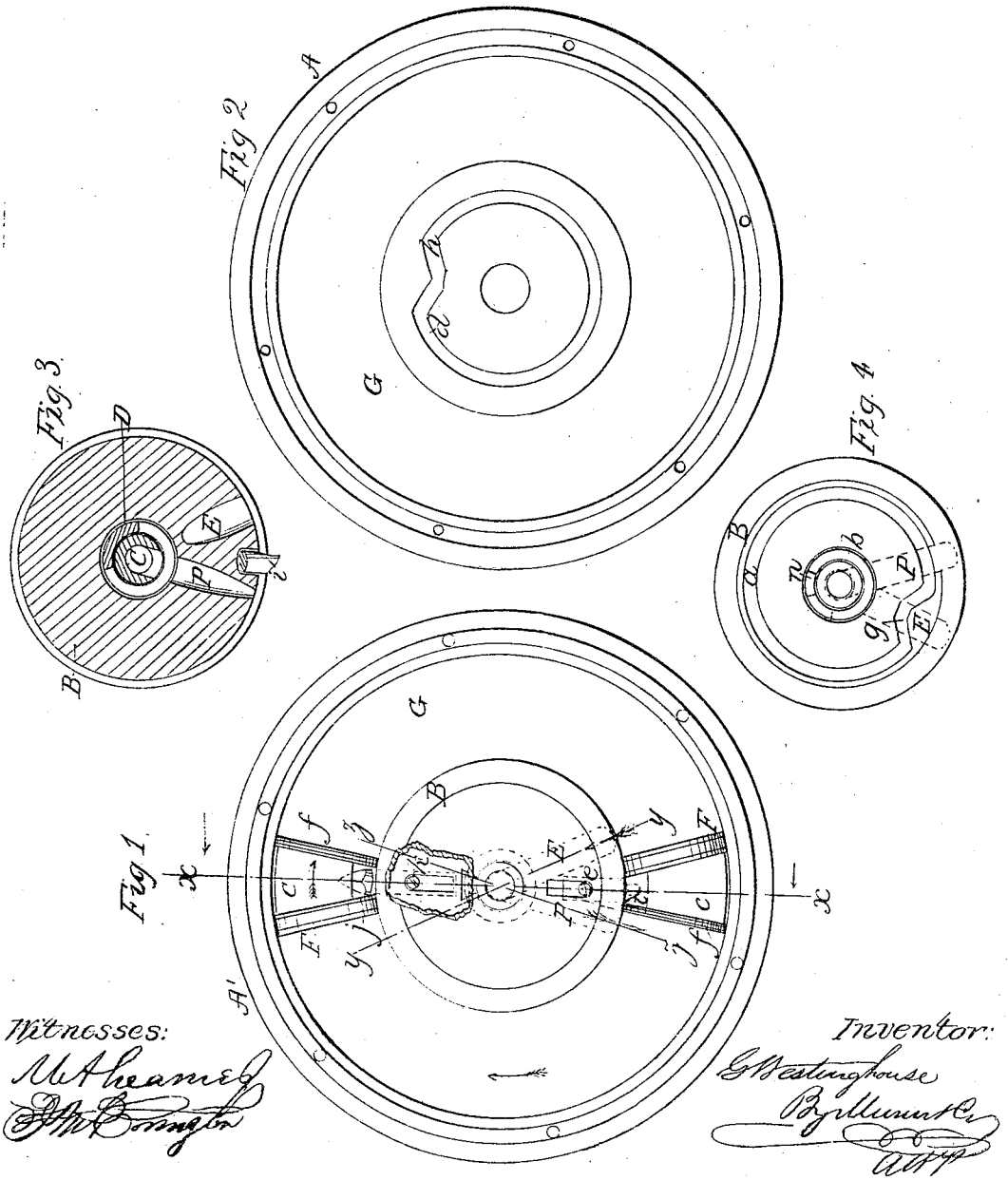
2 Sheets—Sheet 1.

G. WESTINGHOUSE, Jr.

ROTARY STEAM ENGINE.

No. 50,759. Patented Oct. 31, 1865.



Witnesses:
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Inventor:
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2 Sheets—Sheet 2.

G. WESTINGHOUSE, Jr.

ROTARY STEAM ENGINE.

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Fig 8.

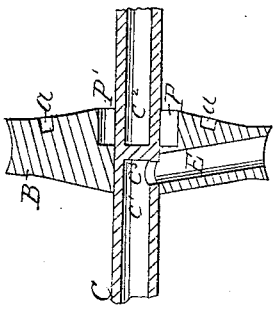

Fig 5.

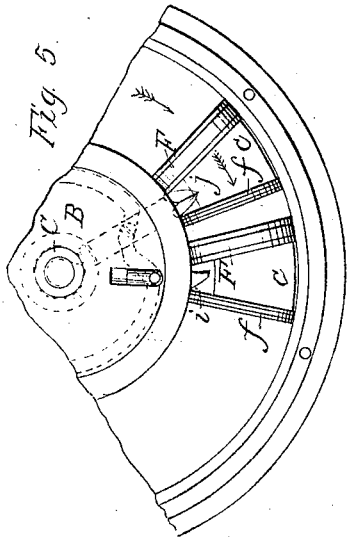

Fig 7

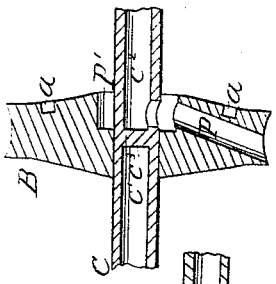

Fig 6.

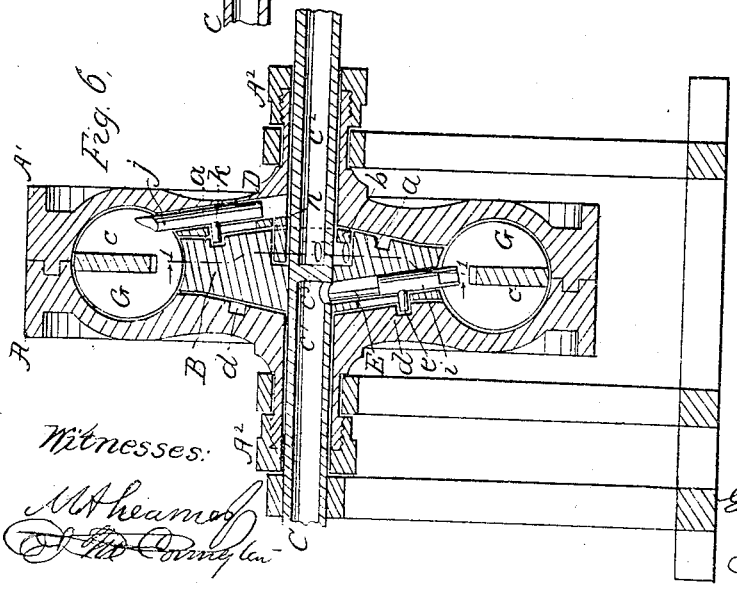

Fig 9

Witnesses:

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Inventor.

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UNITED STATES PATENT OFFICE.

GEORGE WESTINGHOUSE, JR., OF SCHENECTADY, NEW YORK.

IMPROVEMENT IN ROTARY STEAM-ENGINES.

Specification forming part of Letters Patent No. **50,759**, dated October 31, 1865.

To all whom it may concern:

Be it known that I, GEORGE WESTINGHOUSE, Jr., of the city and county of Schenectady, and State of New York, have invented a new and useful Improvement in Rotary Engines; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is an inside elevation of the part A′ of the engine, showing, also, the piston F and the center piece B. Fig. 2 is an inside elevation of the part A. Fig. 3 is a section of the center piece, taken on the line 1 1 of Fig. 6. Fig. 4 is a view of the center piece from the side opposite to that shown in Fig. 1. Fig. 5 shows the pistons in the positions they occupy when the left-hand piston in that figure is about to become movable and the other stationary, the steam being then cut off. Fig. 6 is a cross-section of the engine, taken on the diametrical line *x* of Fig. 1. Fig. 7 is a cross-section of the center piece, taken on the diametrical line *z* of Fig. 1. Fig. 8 is a cross-section of the center piece, taken on the diametrical line *y* of Fig. 1.

Similar letters of reference indicate like parts.

This invention consists in a novel construction of a rotary engine, the cylinder of which is annular and is contained in a disk which is made to revolve about a hollow stationary shaft, through the opposite ends of which the steam is admitted and exhausted.

The engine is made in the form of a disk, whose weight and thickness will be or may be made sufficient to make it serve for a balance-wheel. The disks are made in halves or divisions A A′, firmly connected together by screws or bolts.

A hollow shaft, C, which passes axially through it, is fixed in the bearings on which it rests, but the disk is fitted to revolve around the shaft. In each half or part of the disk I make an annular groove, which, when the parts are united, form an annular chamber, G, which receives pistons F F.

B is a center piece inclosed between the parts of the disk and firmly fixed to the shaft C. The perforation through the shaft is divided into two divisions, C' C^2, by a diaphragm, C^3, which is placed nearly in a diametrical plane, which would bisect the center piece B.

C' is the passage through which steam is exhausted from the cylinder. It connects with an exhaust-port, E, which extends radially through the center piece and opens into the annular cylindrical space G.

C^2 is a steam passage through the shaft, which connects with a circular space, P′, made about it in the center piece B, from which space a steam-port, P, extends radially through the center piece to the cylindrical space G.

The communication between the exhaust-port E and passage C' is always open, but that between the steam-port P and the steam-passage C^2 is periodically shut off by a valve, D, which projects from a collar or ring, *b*, which is received in the space P′, and which is made to revolve therein about the shaft by means of a projection, *n*, on the edge opposite to that which has the valve-projection D, and which projection *n* fits into a recess made in the part A′ of the disk. (See Fig. 6.) The ring *b* and the valve D is by this means carried along with the disk or cylinder of the engine in its revolution about the shaft. The valve D may be made shorter or longer than here shown, so as to cut off the steam at any desirable part of the revolution of the engine.

a is a groove made in that face of the center piece B which comes in contact with the part A′ of the engine. The groove is a true circle, except at that part of it which overlies the exhaust-port P, where it is suddenly bent inward at *g*. This groove receives the pin K of a driving-bolt, *j*, which slides in a radial groove made for it in the part A′ of the disk. The inner end of the bolt *j* opens into the same recess which is made in the part A′ for holding the projection *n* of the valve-ring *b*. The outer end of the bolt *j* protrudes into the cylindrical space G during that part of the revolution of the disk in which the pin K is traveling through the circular part of the groove *a*; but it is withdrawn therefrom when the pin H is passing through the bent part *g* of the groove.

d is a groove made in the central portion of the part A of the disk, and which also has a bend, *h*, therein like the bend *g* of the groove *a*.

The groove *d* receives the pin *e* of a locking-bolt, *i*, which slides in a radial groove made for it in the center piece, B. This bolt protrudes into the cylindrical space G at all times, except when the pin *e* is passing through the bend *h* of the groove.

The pistons F are two in number and are made exactly alike. Their peripheries are slightly grooved to receive a suitable packing. They are set in the cylindrical groove G at right angles with its tangential lines, and are made so as to fit across the said space, but not so tightly as to prevent their easy movement therein. Each piston is connected by a plate, *c*, with a circular guide, *f*, of equal diameter with the pistons; but the peripheries of the guides are not packed. Their office is to guide and steady the pistons in their movements. The connecting-plates *c* are curved on their outer edges to coincide with the curve of the adjacent side of the cylindrical groove G, along the line of the greatest circumference of the said groove. It follows from this that the convex sides of the connecting-plates will not fit in any other position in the grooves G than that in which they are represented in the drawings. The said plates extend along the said pistons and their guides in the line of their diameters, but do not reach clear across the same, thus allowing room for the protruding ends of the bolts *i* and *j* to enter between the guides *f* and their respective pistons, as hereinafter explained.

It will be observed that one bolt, designated *j*, slides in a receptacle made for it in the half A′ of the disk of the engine, and that consequently it revolves with it, whereas the bolt *i*, sliding in a receptacle in the fixed center-piece, B, has no motion save a longitudinal motion in the receptacle. When the end of the bolt *i* is protruded into the steam-space G it remains there until the bent part *h* of the groove *d* comes round to the place of the bolt, when its pin *e* is pulled inward, thereby causing the bolt to be widthdrawn from the space G. At this time the like change has already taken place in the position of the bolt *j*. When that bolt is protruded into the space G, and is engaged with one of the pistons in the manner shown in Fig. 1, it causes any motion given to that piston by the pressure of steam to be imparted to the disk or cylinder A A′. While such motion is taking place the other piston remains locked in the position shown in Fig. 1, midway between the steam-port P and exhaust-port E. When, in the revolution of the cylinder or disk, the moving piston comes near that one which is shown stationary in Fig. 1, and which latter piston is shown to the left in Fig. 5, the bolt *j* is withdrawn by means of the bent part *g* of the groove *a*, and the moving piston is allowed to come up to the other piston, both of which are then held stationary by the locking-bolt *i* until the bolt *j* has moved beyond the bend *g*, when it will be projected outward so as to engage the stationary piston, and the bolt *i* will be at that time withdrawn by means of the bend *h* of groove *d*. The pistons are then—that is, when the bolt *i* is withdrawn—free to move onward toward the left with the revolving disk or cylinder which incloses them, and they are so moved by means of the frictional contact between the packed edges of the said pistons and the sides of the cylindrical space G. This motion of both pistons continues until the bend *h* has returned the bolt *i* to its former advanced position in the space G, so as to engage that piston F which is toward the right, and which piston is thereby locked so as to remain stationary between the steam and exhaust ports, while the other piston, having been during this change driven by the frictional contact of the disk or cylinder beyond the steam-port, will now receive the pressure of steam and cause the cylinder to revolve, as before explained of the other piston. So soon as the piston to the left has pased the steam-port and engaged the bolt *j* the further revolution of the disk causes the valve D to pass the steam-opening of the passage C^2, and the steam will be allowed to enter behind said piston and drive it, and consequently the disk, around the shaft C and center piece, B, and thereby complete another revolution of the engine. The changes in the positions of the pistons are effected by means of the momentum of the disk, since at the time they are actually occurring the supply of steam is shut off from the engine.

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

1. In rotary engines, the combination of the fixed hollow shaft C and fixed center piece, B, with the rotating disk A A′ and independent pistons F F, substantially as described.

2. Constructing the pistons F, in the manner substantially as above described, with leading guides *f*, connected by plates *c*, the convexity of whose outer edge fits the outer curve of the cylindrical space, substantially as and for the purposes above described.

3. The combination of the sliding bolts *i* and *j* with the traveling pistons, substantially as above described.

4. The combination of the valve D with the disk or cylinder A A′, to which it is attached, constructed and operated substantially as described.

GEORGE WESTINGHOUSE, JR.

Witnesses:

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J. P. HALL.