S. R. CLEVELAND.

ROTARY ENGINE.

No. 185,850. Patented Jan. 2, 1877.

Fig. 1.

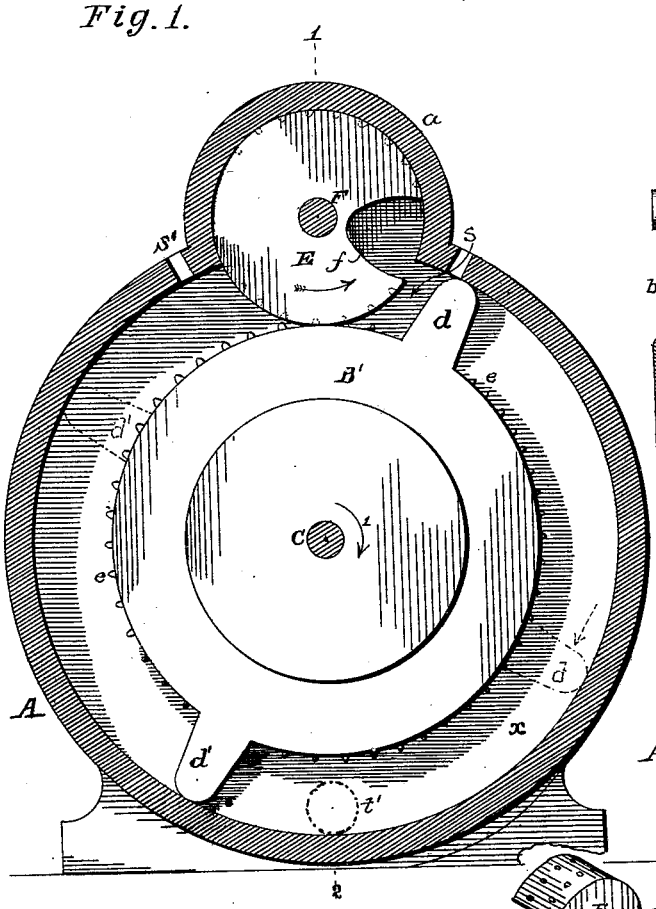


Fig. 2.

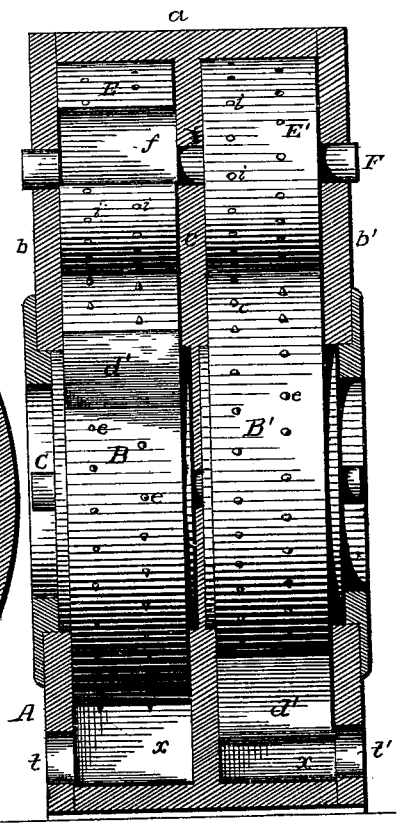
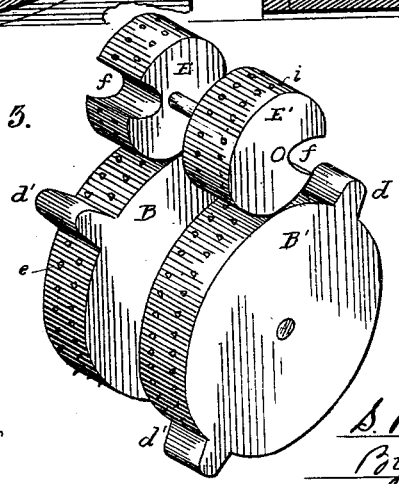


Fig. 3.



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UNITED STATES PATENT OFFICE.

SQUIRE R. CLEVELAND, OF WINNECONNE, WISCONSIN.

IMPROVEMENT IN ROTARY ENGINES.

Specification forming part of Letters Patent No. **185,850**, dated January 2, 1877; application filed September 9, 1876.

To all whom it may concern:

Be it known that I, SQUIRE R. CLEVELAND, of Winneconne, Winnebago county, Wisconsin, have invented Improvements in Rotary Engines, of which the following is the specification:

My invention relates to improvements in that class of rotary engines in which the steam acts upon the projecting vanes or pistons of disks to impart rotation to the latter; and my invention consists in arranging the parts, as fully described hereafter, to simplify the construction, reduce the cost of manufacture, obtain as great a percentage of power as possible, and insure certainty of operation.

In the accompanying drawing, Figure 1 is a sectional elevation of sufficient of a rotary engine to exhibit my improvements. Fig. 2 is a section on the line 1 2, Fig. 1; and Fig. 3, a perspective view, showing the working parts of the engine.

The case A of the engine consists of the shell or body *a*, and two detachable sides or heads, *b b'*, a partition, *c*, dividing the case into two separate circular chambers adapted to receive circular disks B B' secured to a transverse shaft, C, and two smaller chambers, within which fit nicely, but so as to rotate freely, two abutments, E E', secured to the same transverse shaft F. The faces of the disks B and abutments E are turned perfectly true, and are in steam-tight contact with each other, as shown, and from the faces of the disks project pins *e*, which enter corresponding recesses *i* in the abutments, and insure rotation at the same peripheral speed, the abutments being one-half the diameter of the disks, and rotating twice to the single rotation of each disk. The pins are arranged in two series, and alternate, so that only one pin will be upon the line of contact between the disk and abutment at one time, and preventing the passage of steam between the two.

Each disk is smaller in diameter than the chamber in which it rotates, leaving an annular space or channel, *x*, closed transversely at the top by the lower portion of the abutments E, and into this chamber extend, from the periphery of the disk, two vanes or pistons, *d d'*, diametrically opposite each other. Each abutment has a transverse recess, *f*, of such a shape that the pistons will extend into and maintain a steam-tight contact with the sides thereof as the disk and abutment revolve, and the disks and abutments are so adjusted on their shafts that the pistons of one disk are midway between those of the other, as shown in dotted lines, Fig. 1. In the casing, near the top, and on each side of the abutments, are inlet-ports *s s'*, leading to the channels *x*, and in the heads, at the lowest point opposite said channels, are exhaust-ports *t t'*. Suitable valves and cut-off mechanism are employed to admit steam to one or other of the openings *s s'*, according to the direction in which the engine is to revolve.

The parts being in the position shown in the drawing, and steam being admitted to the openings *s*, Fig. 1, it will enter both channels *x*, between the abutments E E' and the pistons *d* of each disk, and will compel the rotation of the latter in the direction of the arrow 1. Before the piston *d* of the disk B is opposite the exit-port *t* the steam will be cut off, and will exhaust through said port after the piston passes it, the steam still acting with full force upon the piston *d* of the disk B', and beginning to act on the piston *d'* of the disk B, which piston is received by the recess in the abutment E as the piston *d* passes the exhaust-port. A similar action ensues as the piston *d* of the disk B' passes the exhaust *t*, and the piston *d'* enters the recess of the abutment E', a practically-continuous pressure of steam being thus maintained upon two pistons traversing in the same direction, and secured to the same shaft. The teeth and recesses at the peripheries of the disks and abutments insure that absolute unison of movement which is necessary for the successful operation of the engine, avoiding the weight, expense, and space of outside gearing, which, however, may be used.

It will be seen that the arrangement described reduces the number of parts to a minimum, avoiding complex and expensive details, and requiring only those parts which are of a character to be readily constructed with that nicety requisite in this class of machinery.

I am aware that two disks, each with a single piston in line with that of the other, have been combined with two rotating recessed cylinders of equal size, and that a single disk

and single cylinder, geared together, have been used; and I make no claim to this principle of operation, my invention consisting of improvements in this class of engines intended to effect the results before specified. I am also aware that the disk and abutment have been provided with teeth meshing into and causing them to turn together.

I claim—

1. The combination of the casing A, its two independent chambers, outlet and inlet ports *s t*, arranged as set forth, the disks B B′, each carrying two pistons arranged equidistant from each other, those on one disk being midway between those of the other, and the rotating abutments E E′ secured to the same shaft, having recesses *f* diametrically opposite each other, and rotated positively in unison with the disks, but at double the speed of the latter, as described.

2. The combination of the disks and abutments, having plain peripheries in steam-tight contact, and pins *e* upon the disks, in alternating series, and corresponding recesses *i* in the abutments, as set forth.

In testimony whereof I have signed my name to this specification in this presence of two subscribing witnesses.

SQUIRE REED CLEVELAND.

Witnesses:

CHARLES E. FOSTER,

WILLIAM L. BRAMHALL.