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Rotary-Engine.

No. 167,367. Patented Aug. 31, 1875.

Fig. 1.

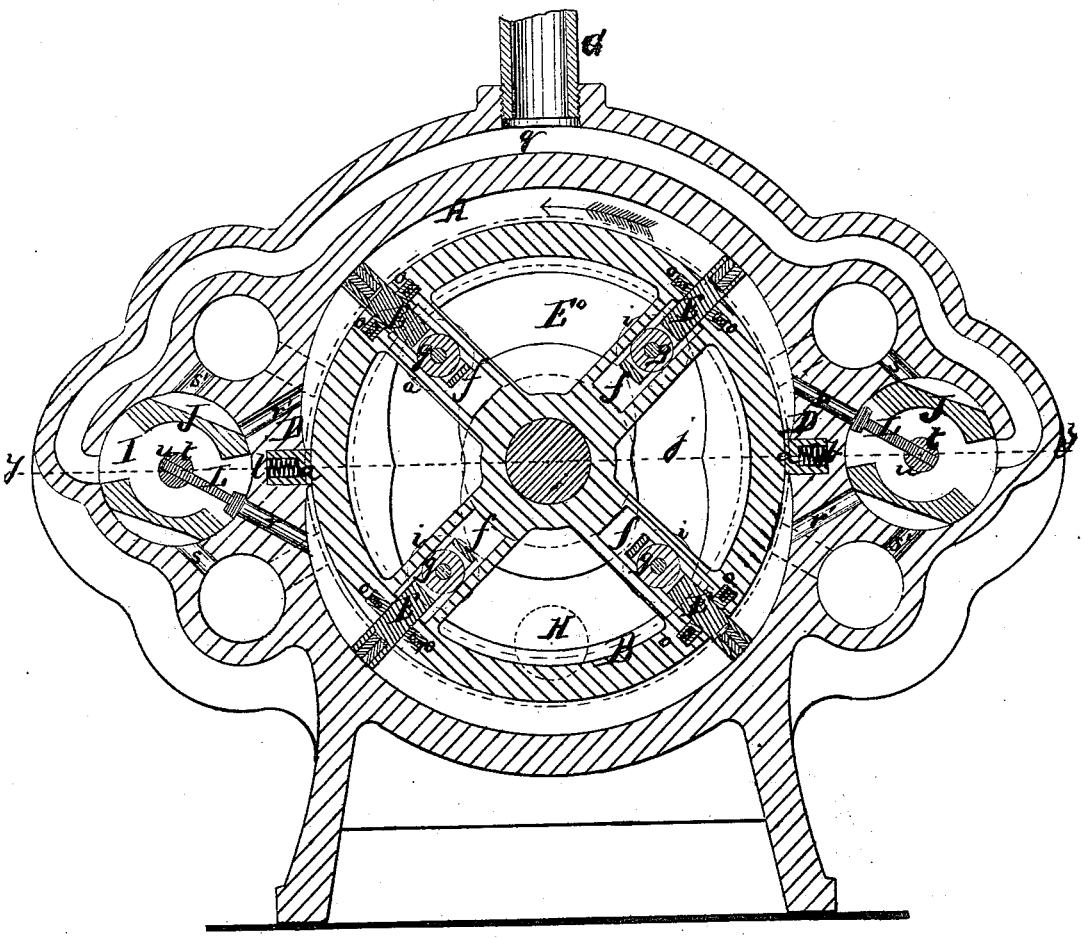

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Fig. 2.

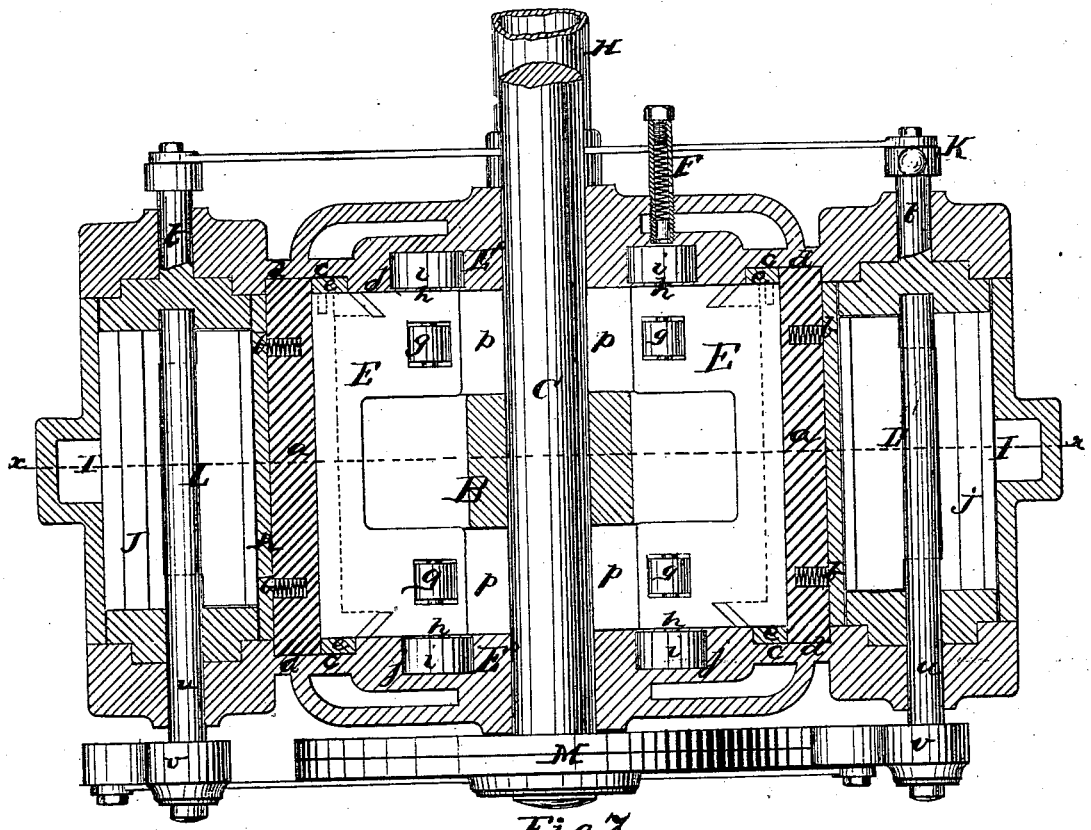

Fig. 7.

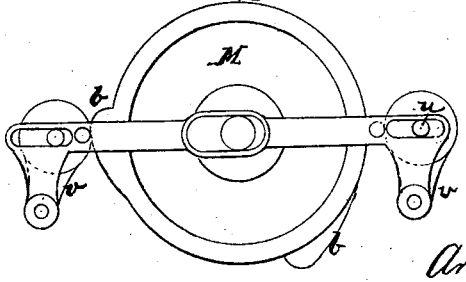

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Fig. 3.

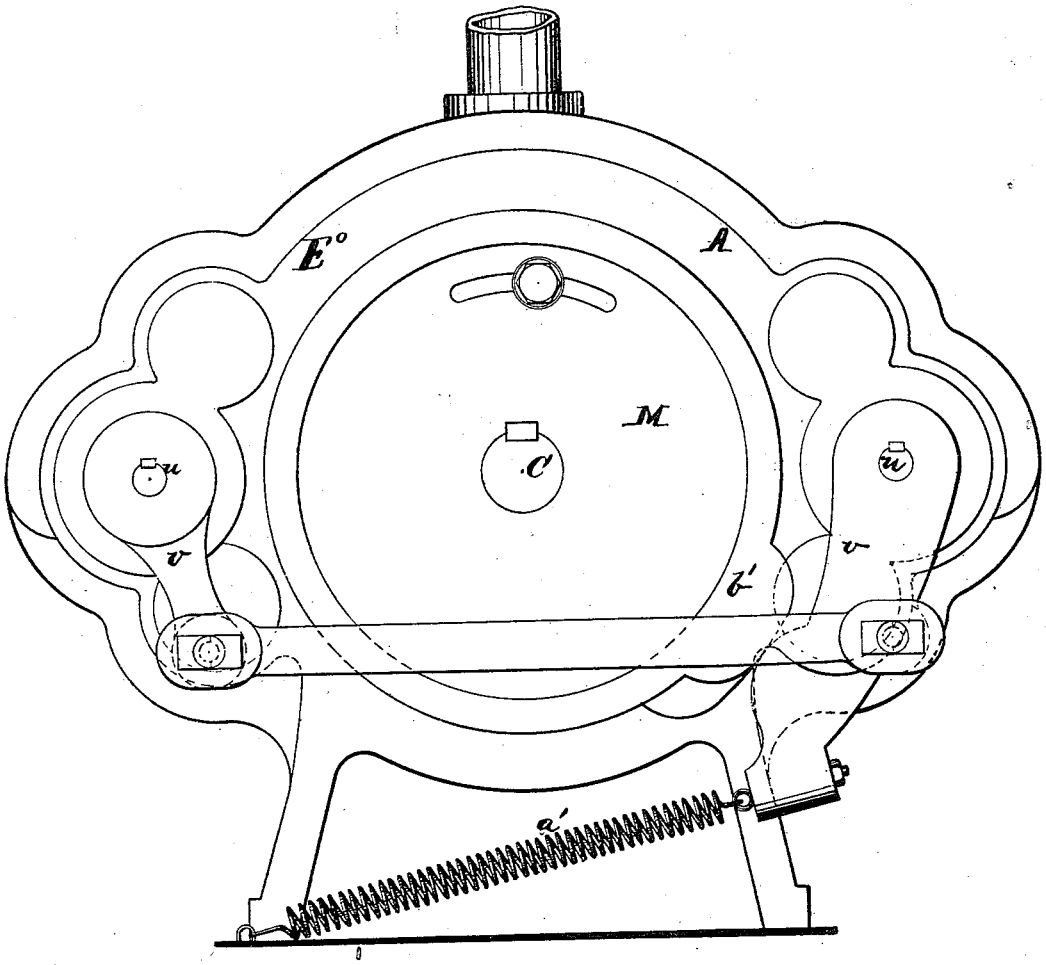

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Fig. 4.

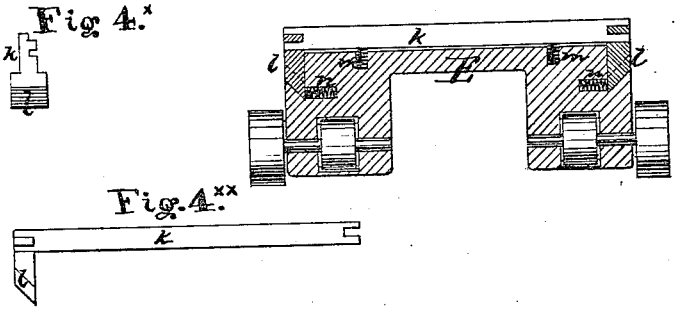


Fig. 5.

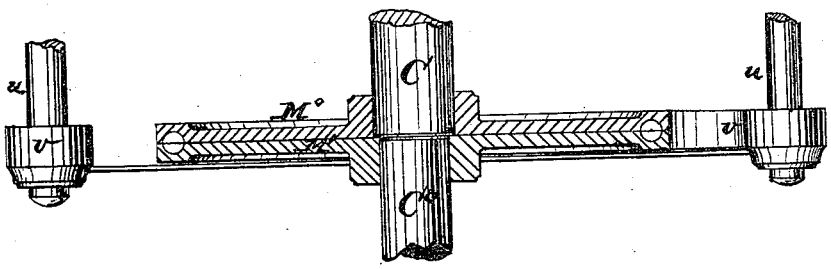
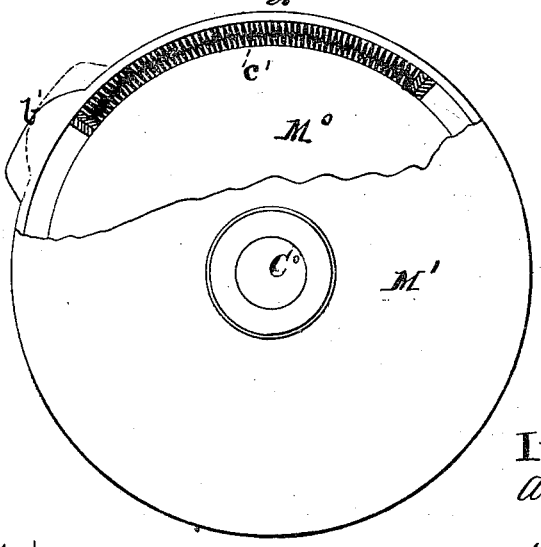


Fig. 6.



Witnesses.
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Attys

UNITED STATES PATENT OFFICE.

ARCHIBALD B. VANDEMARK, OF NEW YORK, N. Y.

IMPROVEMENT IN ROTARY ENGINES.

Specification forming part of Letters Patent No. **167,367**, dated August 31, 1875; application filed June 2, 1875.

To all whom it may concern:

Be it known that I, ARCHIBALD B. VANDEMARK, of the city, county, and State of New York, have invented a new and useful Improvement in Rotary Engines, which improvement is fully set forth in the following specification, reference being had to the accompanying drawing, in which—

Figure 1 represents a vertical section in the plane *x x*, Fig. 2. Fig. 2 is a horizontal section in the plane *y y*, Fig. 1. Fig. 3 is a front view.

The remaining figures are details, which will be referred to as the description progresses.

Similar letters indicate corresponding parts.

This invention relates to a rotary engine of that class in which a piston-wheel is used which carries two or more pistons having a radially-sliding motion, said piston-wheel being fitted into a cylinder which is provided with stationary abutments, one or more, to separate the steam port or ports from the exhaust port or ports.

In my engine each of the sliding pistons is provided with anti-friction rollers to ease its radial motion in the piston-wheel. Each of the pistons is provided with two packing-strips provided with inclined guide-noses fitting in the ends of the piston, said packing-strips being subjected to the action of springs which force them in contact with the inner surface of the cylinder, and also with the inner surface of the cylinder-heads. The piston-wheel projects into grooves in the cylinder-heads, so as to form bridges for the abutments, whereby said abutments are prevented from catching in the guide-grooves of the pistons, and tight joints are preserved. The steam is controlled by a reversing-valve and an oscillating supply-valve, combined with a mechanism for actuating said supply-valve.

In the drawing, the letter A designates the cylinder of my rotary engine, in which works the piston-wheel B, said piston-wheel being mounted on a shaft, C, which extends through the center of the cylinder, and has its bearings in the cylinder-heads. The cylinder is bored out, so that in its interior are formed two abutments, D D, one opposite the other, as shown in Fig. 1. Each of these abutments is provided with a packing-piece, *a*, which is pressed against the surface of the piston-wheel by springs *b*, and the ends of the piston-wheel extend into annular grooves *c* in the cylinder-heads E°, while the packing-pieces *a* extend into recesses *d* in said cylinder-heads, these recesses being equal in depth to the grooves *c*, so that the packing-pieces extend throughout the entire length of the piston-wheel, and as the same pass the guide-grooves of the pistons they bear on bridges *e* formed at the ends of said guide-grooves, thereby preventing them from catching in the grooves and preserving tight joints. The pistons E are fitted into cavities *f* in the piston-wheel, Fig. 1, and they are provided with anti-friction rollers *g*, Fig. 2, so that they move in and out with freedom. From the ends of each piston project gudgeons *h*, on which are mounted rollers *i*, which travel in cam-grooves *j* in the cylinder-heads, so as to keep the outer ends of the pistons positively in contact with the inner surface of the cylinder. In the outer end of each piston are fitted two packing-strips, *k*, with inclined noses *l*, which catch in oblique recesses in the opposite edges of the body of the piston. (See Fig. 4.) Said packing-pieces are forced outward in a radial direction by springs *m*, and other springs, *n*, serve to force their ends against the cylinder-heads, so that tight joints are formed on all sides. In the cavities *f* of the piston-wheel are placed packing-strips *o*, which are pressed against the sides of the pistons by suitable springs, (see Fig. 1,) so as to prevent the steam from passing down at the sides of said pistons. The piston-wheel is provided with cavities *p*, which fill with steam, so that the pistons are exposed to a uniform pressure from all sides. In one of the cylinder-heads is secured a safety-valve, F, Fig. 3, which is so adjusted that whenever the pressure in the cylinder reaches a certain limit the safety-valve is forced open, and the surplus steam is permitted to escape.

Steam is admitted to the cylinder A through a pipe, G, and it exhausts through the pipe H. The steam-pipe connects by a channel, *q*, with two steam-chests, I I, each of which is provided with two ports, *r r'*, leading into the cylinder, and with two ports, *s s'*, which communicate with the exhaust-pipe H. Said

steam-chests are cylindrical, and each contains a hollow-valve, J, which is so formed that, by turning it to the position shown in Fig. 1, the port *r* is brought in communication with the steam-pipe, and the port *r'* is in communication with the exhaust-pipe, causing the piston-wheel to revolve in the direction of the arrow, marked near it in Fig. 1. By reversing the valves J the motion of the piston-wheel is reversed, and by turning said valves to the proper position steam may be shut off entirely. From one end of each of the valves J extends a stem, *t*, through one of the cylinder-heads, and on these stems are mounted suitable levers, which are connected so that if one of said valves is turned the other has to follow. On one of the valve-stems is mounted the starting-bar K, which serves to turn the valves to the required position. In each of the hollow reversing-valves is situated a cut-off valve, L, which is mounted on a stem, *u*, that extends through the cylinder-head opposite to that through which extend the stems *t* of the valves J. On each of the stems *u* is mounted a lever, *v*, and these two levers are connected, so that both supply-valves have to move simultaneously. One of the levers *v* is subjected to the action of a spring, *a'*, which has a tendency to throw the supply-valves to the position shown in Fig. 1, causing them to close the steam-ports, and to cut off the steam. On the shaft C of the piston-wheel is mounted a disk, M, which is provided with a cam, *b'*, and, as the piston-wheel revolves, this cam acts on one of the levers *v*, and throws the supply-valves open, so as to admit steam to the cylinder. When the cam *b'* passes the lever *v* the supply-valves are closed, and the steam acts by expansion.

The cam-disk M is made in two parts, which can be adjusted so as to decrease or increase the working-surface of the cam *b*, and to regulate the time when steam is cut off. Instead of mounting both sections of the cam-disk M firmly on the shaft C I propose to mount one section, M^0, on said shaft, and the other section, M', on the shaft C^0, which transmits the motion to the working-machines. (See Figs. 5 and 6.) In this case the sections M^0 M' form the coupling for the shaft C C^0, and in the interior of said sections is placed a spring, *c'*, so that when the resistance increases the section M^0 turns a certain distance independent of the section M', and thereby the working-surface of the cam *b'* is increased, and the supply-valves are kept open during a larger part of the revolution of the piston-wheel than they are if the resistance decreases.

Instead of closing the supply-valves L by the action of a spring I can impart to them a positive motion in either direction. This purpose is effected by applying two cam-disks, M, one of which serves to open the supply-valves, while the other serves to close the same. (See Fig. 7.)

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

1. The piston-wheel E^0, having the radial cavities *f*, in combination with the pistons E, having the anti-friction rollers *g*, and arranged in said radial cavities and gudgeons *h*, having rollers *i* working in cam-grooves in the cylinder-heads, substantially as described.

2. The combination of the radially-arranged pistons E, the packing-strips *k*, provided with inclined guide-noses fitting in recesses in the ends of the pistons, and springs *m* and *n*, for forcing the packing-pieces in a radial direction, and against the cylinder-heads, substantially as described.

3. The abutments D, provided with the packing-strips *a*, and springs *b*, for forcing the same outward, in combination with the piston-wheel B, and the cylinder-heads E^0, having the grooves *c* and bridges *e*, all substantially as described.

4. The combination of the reversing-valve J, with the oscillating supply-valve L, and mechanism for actuating said supply-valve, substantially as set forth.

5. The disks M^0 M', and intervening spring *c*, in combination with the cut-off valve L, with the shaft C of the engine, and with a shaft, C^0, transmitting motion to the working-machines, substantially as shown and described.

6. The combination of a compound cam, M *b'*, with the cut-off valve L, substantially as shown and described.

In testimony that I claim the foregoing I have hereunto set my hand and seal this 31st day of May, 1875.

A. B. VANDEMARK. [L. S.]

Witnesses:

W. HAUFF,

E. F. KASTENHUBER.