

No. 683,834.

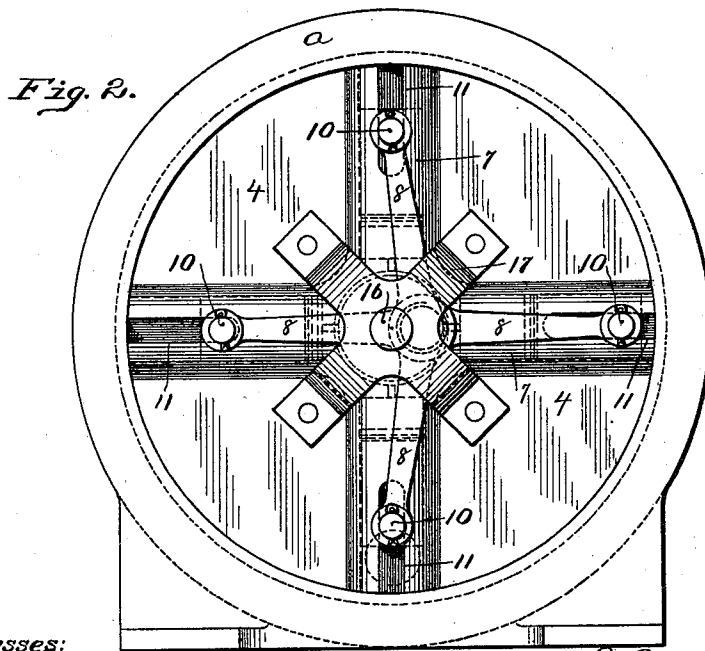
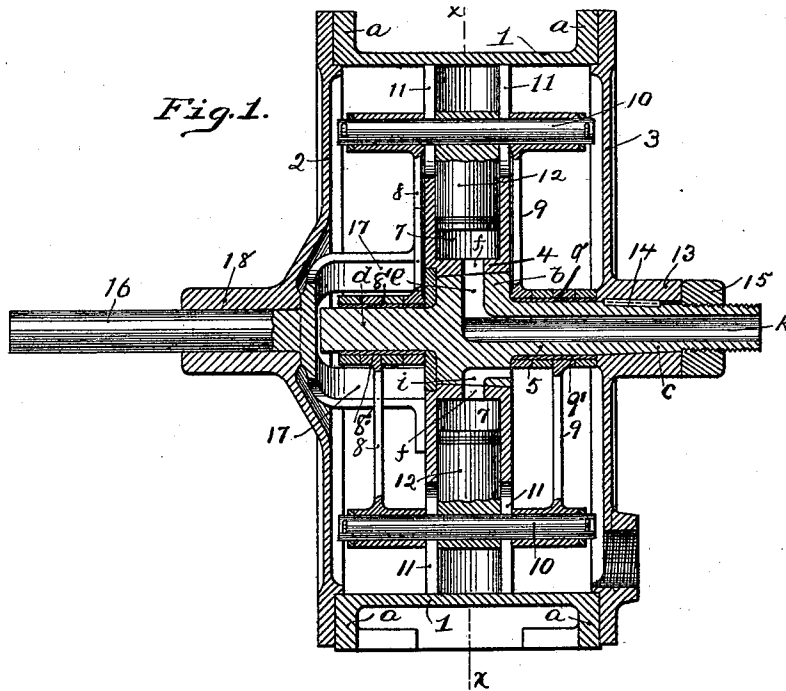
Patented Oct. 1, 1901.

J. C. BECKFIELD.  
ROTARY ENGINE.

(Application filed Aug. 25, 1900.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses:

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3 Sheets—Sheet 2.

Fig. 3.

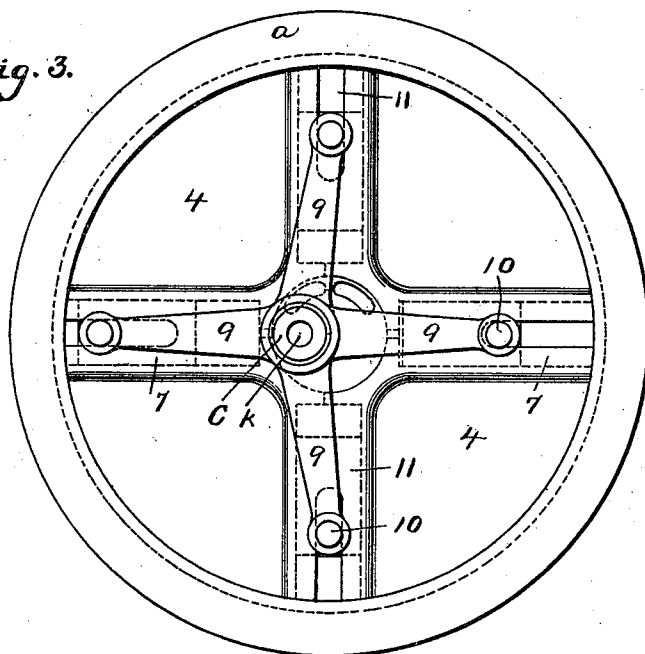
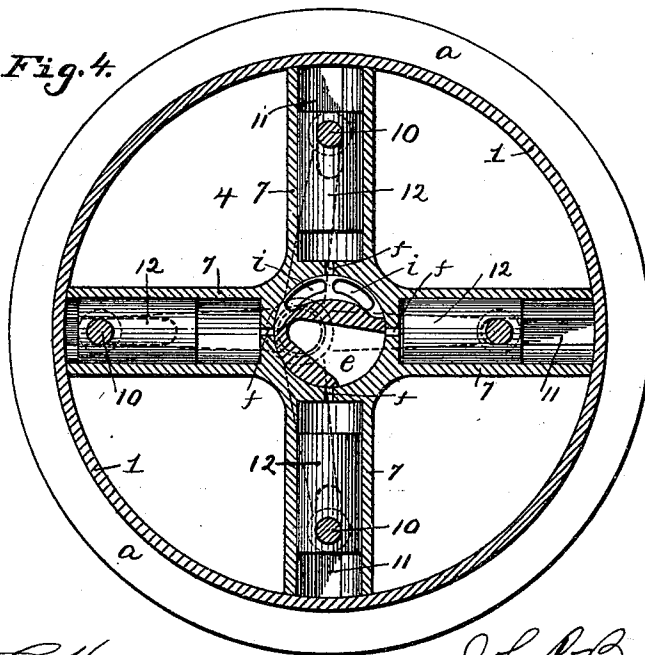


Fig. 4.



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3 Sheets—Sheet 3.

Fig. 5a

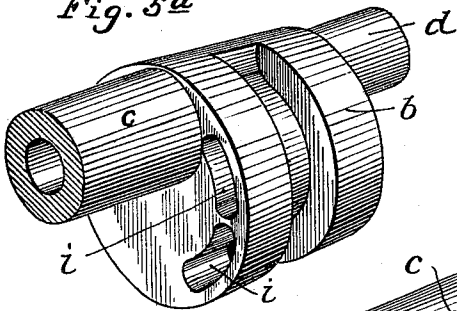


Fig. 5.

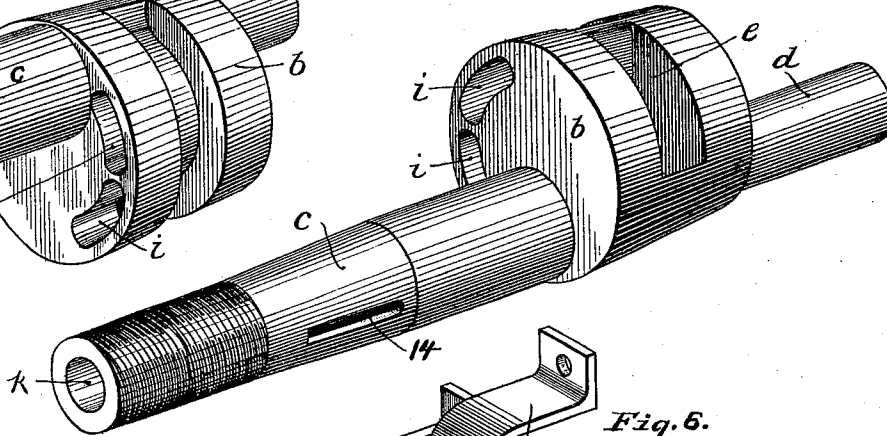


Fig. 6.

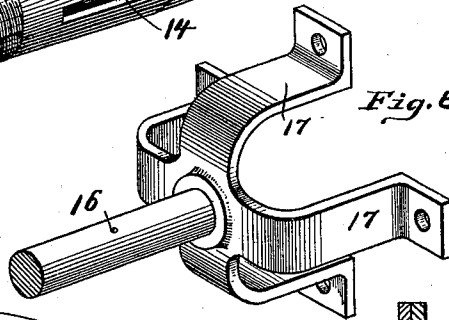


Fig. 7.

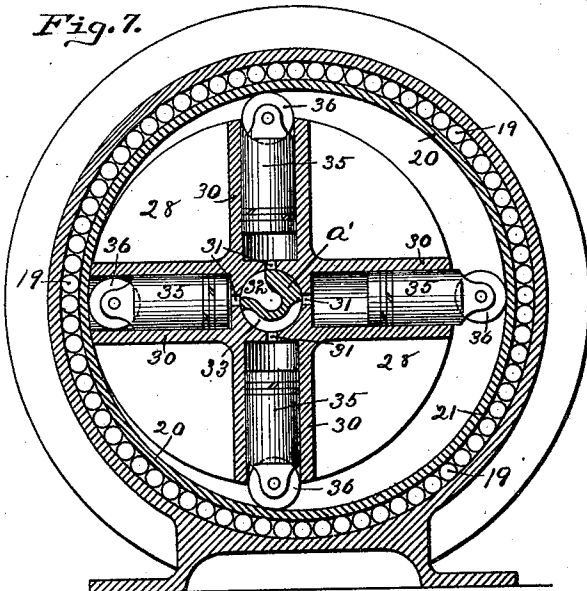
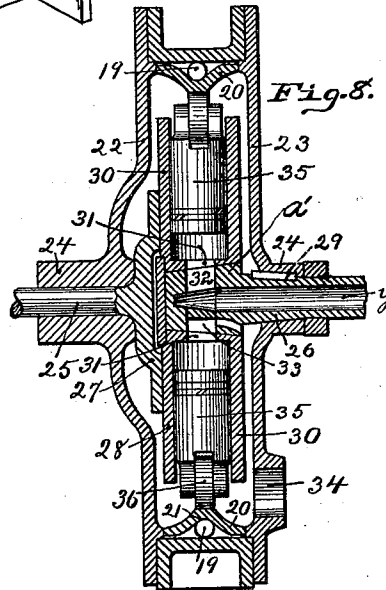


Fig. 8.



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# UNITED STATES PATENT OFFICE.

JOHN C. BECKFIELD, OF PITTSBURG, PENNSYLVANIA.

## ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 683,834, dated October 1, 1901.

Application filed August 25, 1900. Serial No. 22,066. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN C. BECKFIELD, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a certain new and useful Improvement in Rotary Engines, of which the following is a specification.

My invention relates to that class of engines known as "rotary" engines.

The object of my invention is to simplify the construction and materially reduce the cost of construction of engines of this general class and to increase the efficiency and economy in the operation of the same; and to this end it consists in the novel construction and combination of parts hereinafter specifically pointed out, and illustrated in the accompanying drawings, in which—

Figure 1 indicates a central longitudinal section of my improved rotary engine, the extensions *c* and *d* being brought forward into the plane of section for purposes of illustration. Fig. 2 is an elevation of the left-hand side of the motor shown in Fig. 1, the outer plate of the casing being removed. Fig. 3 is an elevation of the opposite side, the plate of the casing also being removed. Fig. 4 is a section taken on the line *x x* of Fig. 1. Figs. 5 and 5<sup>a</sup> are enlarged perspective views of the valve. Fig. 6 is an enlarged perspective view of the shaft-spider. Fig. 7 is a transverse central section of a modified form of motor. Fig. 8 is a longitudinal central section of the same.

In describing my invention with reference to the accompanying drawings the term "outer end" will be used to designate the left-hand side of Fig. 1, and the term "inner end" will be used to designate the right-hand side of said Fig. 1.

Referring to said drawings, 1 is a cylinder, case, or shell, the ends of which are provided with flanges *a*, to which the heads 2 and 3 are bolted or otherwise suitably secured. The interior of said case or shell is preferably bored or smoothly finished to receive the disk 4, which is loosely mounted upon the non-rotatable or rigidly-secured valve 5, which projects in a correspondingly-tapered opening 6, formed concentrically in said disk. The said valve 5 comprises the enlarged tapered part *b* or valve-body and the contracted parts *c* and *d*, which are eccentrically disposed with relation to the body portion of the valve and to the disk and shell. The said enlarged part *b* of said shaft 5, upon which said disk is loosely mounted, constitutes a valve to supply fluid to the cylinder 7, having formed therein a port *e*, which communicates or registers with the ports *f* of the cylinders 7 at intervals during the rotation of said disk for the purpose of admitting fluid to said cylinders and the exhaust-ports *i i*, which at proper intervals during the rotation of said disk also registers or communicates with the ports in said cylinders for the purpose of exhausting fluid therefrom. The contracted parts *c* and *d* of said valve 5 constitute, respectively, bearings and common centers for the inner ends of links 8 and 9, which are loosely mounted upon bushings 8' and 9', loosely mounted on said bearings. The outer ends of said links are respectively mounted on opposite ends of pins 10, which project through slots 11, formed in the outer ends of said cylinders 7. The pins 10 are connected to the pistons 12, which are located in said cylinders, by passing through orifices or holes formed in the outer ends thereof. It will thus be observed that one of each of said links 8 and 9, correspondingly mounted on opposite sides of said disk, are connected to the same piston, insuring a good and perfect connection between the pistons and said eccentrically-disposed parts of said valve 5, on which the disk is rotatably mounted, and tending to insure steadiness in the motor during the operation of the same. The said contracted part *c* of said valve 5, which projects through the eccentrically-disposed boss 13, formed on the head 3, is rigidly secured in said boss by a spline inserted in the key-way 14, formed in the same, and thus holds the valve rigid or stationary, and is, in effect, the stem of the valve, being centrally bored to form the fluid-admission port *h*, which communicates with the inlet-port of said valve. The extreme outer end of part *c* is screw-threaded to receive the tightening or jam nut 15 and a pipe connected to the fluid source of supply. Motion is transmitted from said cylinder-disk through the power-

shaft 16, which is secured to or made part of the spider 17 and is loosely journaled in the concentrically-disposed boss 18, formed on said head 2. The said spider 17 comprises  
 5 four members, bolted or otherwise secured to the outside of said disk and so disposed that the links 8 are enabled to oscillate between the same without interference.

One side of the valve-body *b* has a ring *g*  
 10 secured thereto in any suitable manner to hold the same to its seat, one side of the cylinder-disk being recessed to receive the same, as shown in Fig. 1.

In Figs. 7 and 8 I show a modified form of my  
 15 apparatus, wherein the shell or case is bored or smoothly finished on the interior for the reception of ball-bearings 19, on which is mounted an antifriction-ring 20, the outer  
 20 surface of said ring having a guide 21, in which the ball-bearings are secured. The said shell or case is adapted to be closed by heads 22 and 23, which are provided with bosses 24, eccentrically disposed with relation  
 25 to said case. The said bosses respectively carry bearings for the power-transmission shaft 25 and the shaft 26, on the enlarged portion *a'* of which, or valve proper, the said disk  
 30 is mounted. The said shaft 25 constitutes the stem of the valve, being centrally bored to form a port *y*, which communicates therewith. The said power-shaft is secured to or made  
 35 part of a bracket or disk 27, which is bolted or otherwise suitably secured to the outer side of the cylinder-disk 28. The said shaft 26 is rigidly secured or held stationary in the boss  
 40 formed on the head 23 by means of a spline or key inserted in the key-seat 29, formed in said shaft and boss. The said cylinder-disk is, as heretofore stated, loosely mounted upon  
 45 the enlarged tapered portion *a'* of the shaft 26 and carries the cylinders 30, formed on one side of said disk, the inner ends of said cylinders 30 being provided with ports 31, which  
 50 communicate at proper intervals during the rotation of the disk with the fluid-admission port 32 of the valve 26 and with the exhaust-ports 33, which open into the case or shell,  
 55 the head 23 of which is provided with an exhaust-opening 34, communicating with the exterior. Pistons 35 are arranged in said cylinder, the outer ends of which are provided  
 60 with rollers 36, which are mounted therein. The said cylinder-disk is eccentrically mounted in the interior of said shell upon the enlarged portion of the valve, as shown in Figs.  
 7 and 8.

It is observable that the cylinders mounted upon the disk are disposed thereon at right angles to each other. This, however, is not  
 65 absolutely essential nor is it necessary that there be four cylinders, as one or more may be utilized without departing from the spirit of my invention.

By careful observation of the operation of  
 65 my improved engine it has been noted that vibration has been entirely avoided.

I have shown the shell or case provided with

heads at each end. This, however, is not essential, as the head through which the power-shaft projects may be omitted.

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

1. In a rotary engine, the combination of a shell or frame, a disk rotatably mounted  
 75 therein carrying cylinders having pistons operable therein, a centrally-disposed stationary valve on which said disk is mounted the said valve being supported by a tubular shaft secured to the shell or frame and eccentrically  
 80 disposed with relation to the valve, and propulsion-links the inner ends of which are mounted upon the said tubular shaft which constitutes the common center therefor and  
 85 the outer ends of said links being connected with the pistons in said cylinders.

2. In a rotary engine, the combination of a shell or frame, a disk rotatably mounted  
 90 therein carrying cylinders having pistons operable therein, a stationary valve concentrically disposed with relation to said disk which is mounted thereon and with the shell, the said valve having an eccentrically-disposed  
 95 tubular part projecting from one side thereof and a cylindric part opposite thereto and concentric therewith, and means to connect the stems of the pistons with the eccentrically-disposed  
 100 projections of the valve, substantially as described.

3. In a rotary engine, the combination of a shell or frame, a disk rotatably mounted  
 105 therein carrying cylinders having pistons operable therein, a stationary or fixed valve on which said disk is mounted having a tubular eccentrically-disposed portion projecting  
 110 from one side thereof and a shaft or spindle on the opposite side concentric with said tubular portion, links mounted on each side of said disk the inner ends thereof, respectively,  
 115 being mounted on the eccentric projections of said valve and the outer ends thereof connected to said pistons, substantially as described.

4. In a rotary engine, the combination of a shell or frame, a disk rotatably mounted  
 120 therein carrying cylinders having pistons operable therein, a stationary or fixed valve on which said disk is mounted provided with inlet and exhaust ports, a tubular shaft projecting from one side of said valve and eccentrically disposed with relation to said  
 125 valve and provided with a port adapted to communicate with the inlet-port in said valve, and means to transmit power from said disk, substantially as described.

5. A rotary engine having a centrally-disposed stationary valve having inlet and exhaust  
 130 ports and having eccentrically-disposed extensions one of which is tubular and provided with a port adapted to communicate with the inlet-port in said valve, substantially as described.

6. In a rotary engine, the combination of a shell, a disk rotatably mounted therein carrying  
 135 radially-disposed cylinders having pis-

tons operable therein, a centrally-disposed stationary valve on which said disk is loosely mounted and having inlet and exhaust ports adapted to communicate with said cylinders, the said valve having eccentrically-disposed projections on both sides thereof one of which is provided with an opening longitudinally thereof adapted to communicate with the inlet-port of said valve, and propulsion-links the inner ends of which are mounted on the eccentric projections of said valve which serve as common centers therefor the outer ends of said links being connected to the pistons, substantially as set forth.

7. In a rotary engine, the combination of a supporting-frame, a rotatable disk carrying cylinders having pistons operable therein, a centrally-disposed stationary valve on which said disk is mounted the said valve being supported by a tubular shaft secured in said frame and eccentrically disposed with relation to the valve, and propulsion-links mounted on said tubular shaft intermediate the valve and the frame, substantially as described.

8. In a rotary engine, the combination of a supporting-frame, a rotatable disk carrying cylinders having pistons operable therein, a centrally-disposed stationary valve on which said disk is mounted having a tubular projection on one side which is rigidly secured in the frame and a solid spindle on the opposite side concentric with the tubular projection the said solid spindle and tubular projection being eccentrically disposed with relation to the valve, bushings loosely mounted on said tubular projection and said solid spindle, propulsion-links the inner ends of which are mounted upon said loose bushings respectively the opposite ends thereof being connected with the pistons, substantially as described.

9. In a rotary engine, the combination of a centrally-disposed stationary valve having a disk carrying cylinders concentrically and rotatably mounted thereon, said valve having an extension on each side thereof concentric

to each other and eccentrically disposed with relation to said valve and disk one of the extensions being tubular and rigidly secured to a frame, links mounted on said extensions and connected to pistons operable in said cylinders, and means for transmitting power from said cylinders, substantially as described.

10. In a rotary engine, the combination of a centrally-disposed stationary valve having a disk carrying cylinders concentrically and rotatably mounted thereon, said valve having an extension on each side thereof concentric to each other and eccentrically disposed with relation to said valve and disk, one of the extensions being tubular and rigidly secured to a frame, links mounted on said extensions and connected to pistons operable in said cylinders, and a spider-shaft connected to said disk for transmitting power, substantially as described.

11. In a rotary engine, the combination of a supporting-frame, a rotatable disk carrying cylinders having pistons operable therein, a centrally-disposed stationary valve on which said disk is mounted, the said valve being supported by a tubular shaft secured in said frame and eccentrically disposed with relation to the valve, and propulsion-links mounted on said tubular shaft intermediate the valve and frame, substantially as described.

12. A rotary engine having a centrally-disposed stationary valve provided with inlet and exhaust ports and having eccentrically-disposed laterally-projecting portions one of which is tubular and provided with a port adapted to communicate with the inlet-port in said valve and having a ring secured to one side of the valve, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

JOHN C. BECKFIELD.

In presence of—

C. A. WILLIAMS,  
JOHN H. RONEY.