No. 841,776. PATENTED JAN. 22, 1907.

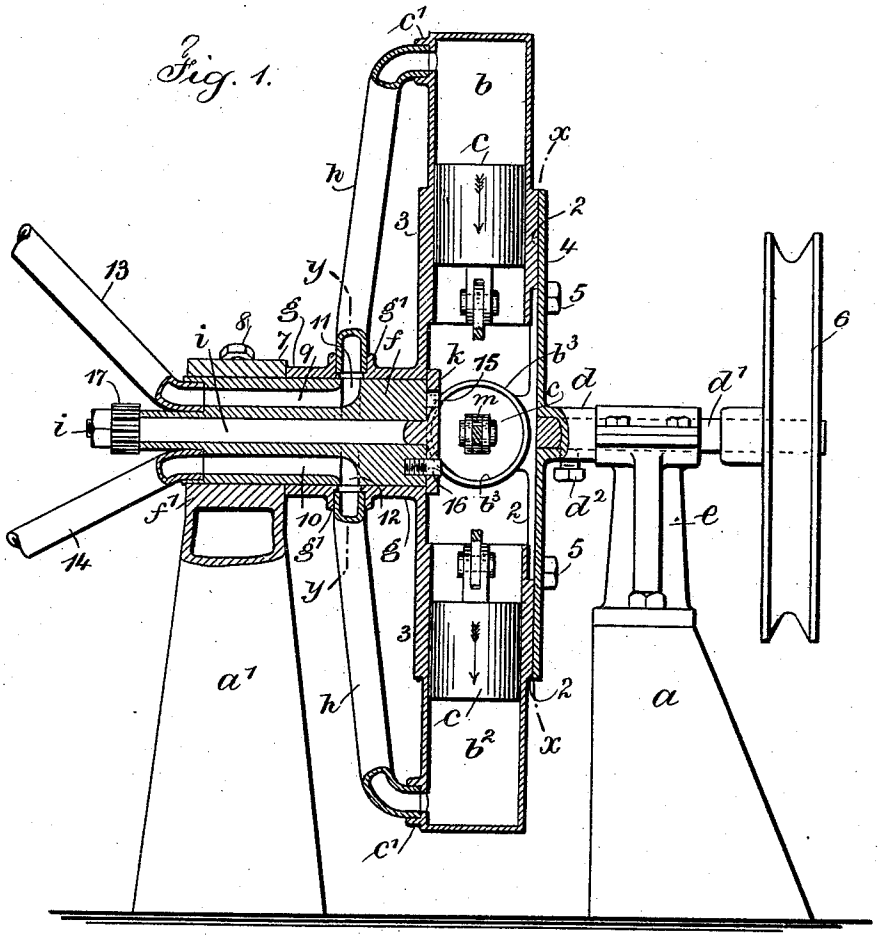
C. GRAESICKE.

ROTARY ENGINE.

APPLICATION FILED MAY 24, 1906.

2 SHEETS—SHEET 1.

Fig. 1.



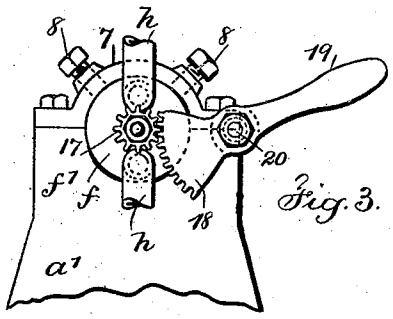


Fig. 3.

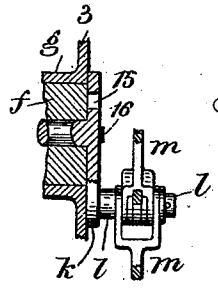


Fig. 4.

Witnesses

Chas. H. Smith

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his atty

THE NORRIS PETERS CO., WASHINGTON, D. C.

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2 SHEETS—SHEET 2.

Fig. 2.

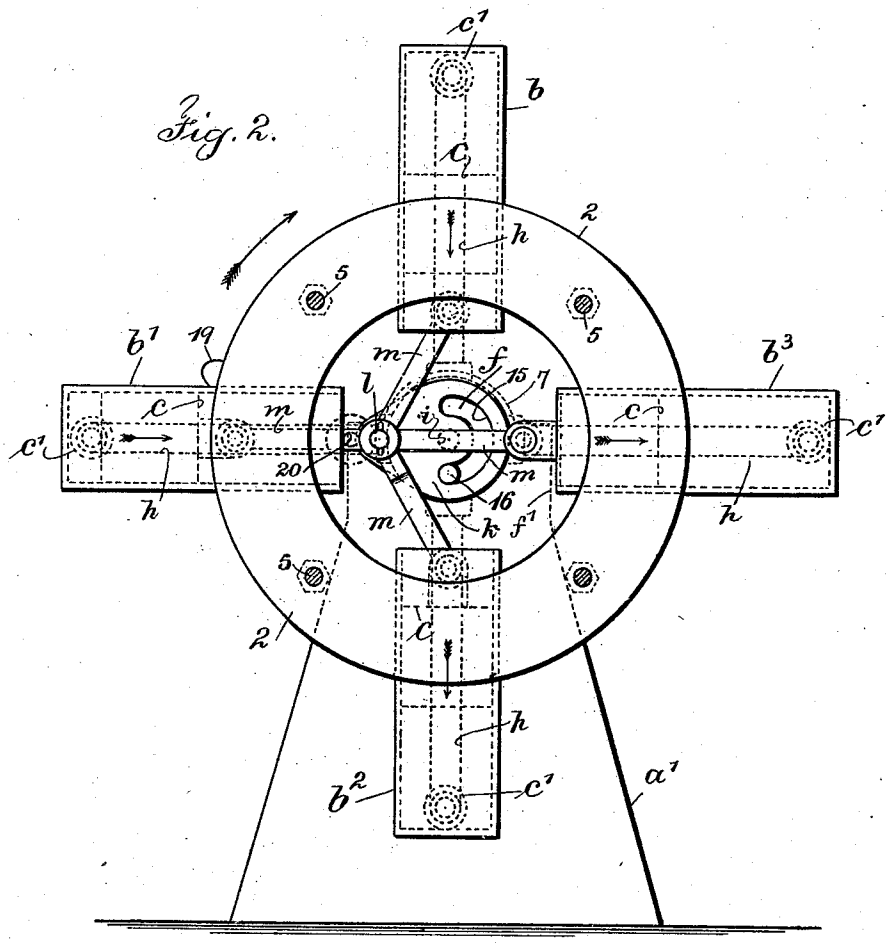
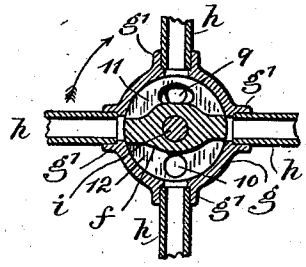


Fig. 5.



Witnesses

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UNITED STATES PATENT OFFICE.

CHARLES GRAESICKE, OF GLENDALE, NEW YORK.

ROTARY ENGINE.

No. 841,776. Specification of Letters Patent. Patented Jan. 22, 1907.

Application filed May 24, 1906. Serial No. 318,456.

To all whom it may concern:

Be it known that I, CHARLES GRAESICKE, a citizen of the United States, residing at Glendale, in the borough of Queens, city and State of New York, have invented an Improvement in Rotary Engines, of which the following is a specification.

My invention relates to rotary engines, and particularly to that type of this class of engines in which a series of cylinders are caused to rotate to turn a power-shaft through the intervention of pistons, connecting-rods, and a fixed eccentric crank-pin. Heretofore in the construction of engines of this class the rotary member in some instances has been inclosed in a suitable casing and connected with the drive-shaft by suitable gearing, while in other instances the rotary frame or member has been connected directly to the drive-shaft; but in all instances, so far as I am aware, the necessary steam-valves, ports, and connections have involved a complicated structure; and the object of my present invention is more particularly the simplification of these latter-named parts.

In carrying out my invention I provide a revoluble frame, cylinders secured therein, pistons in said cylinders, a drive-shaft connected to one side of the said frame and journaled in a suitable bearing provided therefor, a hub at the opposite side of said frame and provided with steam and exhaust ports and secured in a suitable support, a sleeve secured to the opposite side of said frame and fitting over and revoluble on the said fixed hub, a crank-pin plate at the end of said hub, a crank-pin fixed in said plate, connecting-rods extending between the said crank-pin and the several pistons, and means for shifting the position of the said crank-pin to reverse the direction of rotation of the engine.

In the drawings, Figure 1 is a side elevation and partial cross-section of my improved rotary engine. Fig. 2 is an end elevation and section on line x x, Fig. 1. Fig. 3 is an end elevation of the reversing mechanism. Fig. 4 is an elevation and partial section of the crank-pin plate and crank-pin, taken at right angles to the position shown in Fig. 1; and Fig. 5 is a section on line y y, Fig. 1.

a a' designate respective right and left beds or bases, as indicated in Fig. 1, upon which the rotary engine is set.

In carrying out my invention I employ, as illustrated, a ring 2 and disk 3, between which a series of equally-spaced-apart cylinders b b' b^2 b^3 are radially secured. The outer end of each of these cylinders is preferably closed, while the inner end thereof is open, and, as is customary, within each cylinder I employ a piston, (indicated at c.) A disk 4, similar to the ring 2 and of equal diameter, is secured concentrically thereto by means of bolts 5 or otherwise, and this disk 4 is provided with a hub d, adapted to fit over a drive-shaft d', journaled in a suitable pillow-block e, supported upon the bed a. The disk 4 is made fast to the drive-shaft d' by a set-screw d^2, passing through the hub d, and on the other side of the pillow-block e the drive-shaft d' is provided with a pulley 6 or other equivalent means by which the power may be transmitted to the apparatus to be driven.

f designates a hub, preferably made of suitable metal and cylindrical in form. The base a' supports a suitable head f', provided with a bearing in which the outer end of the hub f is received and in which the same is securely fixed in position by means of a cap 7 and set-screws 8. The hub f is provided with a steam-port 9 and an exhaust-port 10, preferably running parallel with one another and at diametrically opposite points, one terminating in a transverse peripheral groove 11 and the other in a similar transverse peripheral groove 12 on the opposite side of the hub, and at the outer end steam and exhaust connections 13 and 14, respectively, may be connected with the steam and exhaust ports 9 10.

The disk 3 is provided with a sleeve g, extending centrally therefrom and adapted to receive and fit over that portion of the hub f projecting from the head f'. The sleeve g is provided with series of lugs g', so located as to come immediately above the transverse peripheral grooves 11 12, in which the steam and exhaust ports 9 10 terminate, and each of these lugs g' is provided with an opening or port. Each of the cylinders b b' b^2 b^3 at the outer end thereof is also provided with a lug, (indicated at c',) in each of which is an opening or port similar to that provided in each of the lugs g', the lugs g' being further located in line with the said cylinders. Between the opening in the lug g' corresponding with every cylinder and the opening in the lug c' of the cylinder is a pipe or other connection, (indicated at h.)

Centrally and longitudinally the hub f is provided with a bore adapted to receive a

rod *i*, which fits the same and extends through the hub *f*. At the inner end this rod *i* is provided with a crank-pin plate *k*, in which eccentrically is secured a crank-pin *l*. The crank-pin plate *k* is also provided with an approximately semicircular slot 15, through which extends a stop-pin 16, which is secured in the inner end of the hub *f*, each piston *c* being connected with the crank-pin *l* by a connecting-rod, (indicated by *m*.) On the outer end of the rod *i* a pinion 17 is fixed, and I also employ a segmental rack 18, meshing with the pinion 17, provided with a handle 19, and pivotally mounted at 20 in the head *f'*.

It will be apparent that in the position indicated in Fig. 2 the admission of steam or other fluid under pressure through the port 9 will cause the revoluble parts to rotate in the direction indicated by the arrow and that by turning the crank-pin *l* to the opposite side of the center by means of the crank-pin plate *k*, the rod *i*, the pinion 17, and rack 18 the revoluble parts will be caused to turn in the opposite direction. Further, it is to be noted that the transverse peripheral grooves 11 12 in the hub *f* and in which, respectively, the steam and exhaust ports 9 10 terminate are of such an extent that practically at all times steam or other fluid under pressure is being admitted to two adjacent cylinders, while the exhaust from the other two cylinders is open.

I claim as my invention—

1. In a rotary engine, the combination with a base and a revoluble frame, of cylinders mounted in said frame, pistons in said cylinders, a drive-shaft at one side of said frame, a bearing for the same, a hub fixed at the other side of said frame and having steam and exhaust ports therein, a sleeve secured on the other side of said frame and adapted to fit over said hub, connections between said steam and exhaust ports and the end of each cylinder, a fixed crank-pin and a connecting-rod extending between said crank-pin and each of said pistons.

2. In a rotary engine, the combination with a base and a revoluble frame, of cylinders mounted in said frame, pistons in said cylinders, a drive-shaft at one side of said frame, a bearing for the same, a hub fixed at the other side of said frame and having steam and exhaust ports therein, a sleeve secured on the other side of said frame and adapted to fit over said hub, connections between said steam and exhaust ports and the end of each cylinder, a fixed crank-pin and means for shifting the position of said crank-pin to reverse the direction of rotation of the engine.

3. In a rotary engine, the combination with a base and a revoluble frame, of cylinders fixed in the said frame, pistons for the said cylinders, a drive-shaft secured to one side of the said frame, a bearing for the same, a hub fixed at the opposite side of said frame and having steam and exhaust ports therein, a sleeve secured on the opposite side of said frame and adapted to fit over said hub, connections between said steam and exhaust ports and the end of each cylinder, a crank-pin plate at the inner end of said hub, a crank-pin fixed in said plate and connecting-rods extending between the said crank-pin and the said pistons.

4. In a rotary engine, the combination with a base and a revoluble frame, of cylinders fixed in the said frame, pistons for the said cylinders, a drive-shaft secured to one side of said frame, a bearing for the same, a hub fixed at the opposite side of said frame and having steam and exhaust ports therein, a sleeve secured on the opposite side of said frame and adapted to fit over said hub, connections between said steam and exhaust ports and the end of each cylinder, a crank-pin plate at the inner end of said hub, a crank-pin fixed in said plate and means for turning the said crank-pin plate to shift the position of the crank-pin to reverse the direction of rotation of the engine.

5. In a rotary engine, the combination with a base and a revoluble frame, of cylinders fixed in the said frame, pistons for the said cylinders, a drive-shaft secured to one side of the said frame, a bearing for the same, a hub fixed at the opposite side of said frame and having steam and exhaust ports therein, a sleeve secured on the opposite side of said frame and adapted to fit over said hub, connections between said steam and exhaust ports and the end of each cylinder, a crank-pin plate at the inner end of said hub, a crank-pin fixed in said plate, means for turning the said crank-pin plate to shift the position of the crank-pin to reverse the direction of rotation of the engine, and means for limiting the shifting movement of the said crank-pin plate.

6. In a rotary engine, the combination with a base and a revoluble frame, of cylinders fixed in equidistant radial positions in the said frame, pistons in the said cylinders, a drive-shaft secured to one side of the said frame, a bearing for the same, a hub fixed at the opposite side of said frame and having steam and exhaust ports therein, a sleeve secured on the opposite side of the said frame and having ports therein adapted to register with said steam and exhaust ports in the said hub, connections between said ports in the said sleeve and the ends of the said cylinders, a fixed crank-pin and a connecting-rod extending between the said crank-pin and each of the said pistons.

7. In a rotary engine, the combination with a base and a revoluble frame, of cylinders fixed in equidistant radial positions in the said frame and each having a port at its outer end, pistons in said cylinders, a drive-

shaft secured to one side of said frame, a bearing for the same, a hub fixed at the opposite side of the said frame and having steam and exhaust ports therein running longitudinally and terminating in oppositely-disposed transverse peripheral grooves, a sleeve secured on the opposite side of said frame and adapted to fit over the said hub and provided with ports adapted to register with said transverse peripheral grooves in the said hub, connections between the ports in the said hub and the ports in the said cylinders, a fixed crank-pin and a connecting-rod extending between the said crank-pin and each of the said pistons.

8. In a rotary engine, the combination with a base and a revoluble frame, of cylinders fixed in the said frame, pistons within the said cylinders, a drive-shaft secured to one side of the said frame, a bearing for the same, a hub fixed at the opposite side of the said frame and having steam and exhaust ports therein, a sleeve on the opposite side of said frame and adapted to fit over the said hub, connections between said steam and exhaust ports in the said hub and the end of each cylinder, a crank-pin plate having a semicircular slot therein, a stop-pin secured in the said hub and extending into the said semicircular slot on the crank-pin plate, a crank-pin fixed in said crank-pin plate, a connecting-rod extending between the said crank-pin and each of the said cylinders and means for turning the said crank-pin plate to shift the position of the crank-pin to reverse the direction of rotation of the engine.

9. In a rotary engine, the combination with a base and a revoluble frame, of cylinders fixed in the said frame, pistons within the said cylinders, a drive-shaft secured to one side of the said frame, a bearing for the same, a hub fixed at the opposite side of the said frame and having steam and exhaust ports therein, a sleeve on the opposite side of said frame and adapted to fit over the said hub, connections between said steam and exhaust ports in the said hub and the end of each cylinder, a rod extending longitudinally through the said hub, a crank-pin plate secured to the inner end of the said rod and having a semicircular slot therein, a stop-pin secured in the said crank-pin plate and extending into the said semicircular slot to limit the movement of the said crank-pin plate and determine the position thereof, a crank-pin fixed in the said crank-pin plate, a connecting-rod extending between the said crank-pin and each of the said pistons and means for turning the said rod extending through the said hub a partial revolution to shift the said crank-pin plate and crank-pin to reverse the direction of rotation of the engine.

10. In a rotary engine, the combination with a base and a revoluble frame, of cylinders fixed in the said frame, pistons within the said cylinders, a drive-shaft secured to one side of the said frame, a bearing for the same, a hub fixed at the opposite side of said frame and having steam and exhaust ports therein, a sleeve on the opposite side of said frame and adapted to fit over the said hub, connections between said steam and exhaust ports in the said hub and the end of each cylinder, a rod extending longitudinally through the said hub, a crank-pin plate secured to the inner end of said rod and having a semicircular slot therein, a stop-pin secured in the said crank-pin plate and extending through the said semicircular slot to limit the movement of the said crank-pin plate and determine the position thereof, a crank-pin fixed in the said crank-pin plate, a connecting-rod extending between the said crank-pin and each of the said pistons, a pinion fixed at the outer end of the said rod which extends through the said hub and a pivotally-mounted segmental rack meshing with said pinion whereby said rod may be given a partial revolution to shift the crank-pin plate and crank-pin to reverse the direction of rotation of the engine.

11. In a rotary engine, the combination with a series of revoluble cylinders, their pistons and connecting-rods, of a crank-pin and crank, a shaft to one end of which the crank is secured, a support therefor, a pinion on the opposite end of the shaft and a manually-actuated toothed segment meshing with said pinion for turning the same, the shaft and crank to change the position of the crank-pin and for positively holding the crank-pin as placed to control the direction of rotation and effect the reversal thereof.

12. In a rotary engine, the combination with a series of revoluble cylinders, their pistons and connecting-rods, of a fixed member having fluid-pressure and exhaust ports on opposite sides thereof, a revoluble member surrounding the fixed member and associated with the aforesaid series of revoluble parts and means interposed for opening up communication progressively between said ports and the respective outer ends of the cylinder for conveying the fluid-pressure and the exhaust, a shaft passing axially through the fixed member, a crank and fixed crank-pin on one end of said shaft to which pin the connecting-rods are coupled and manually-actuated devices associated with the opposite end of said shaft for holding the same in a predetermined position and for turning the same and the crank-pin for effecting a reversal of the direction of rotation.

Signed by me this 19th day of May, 1906.

CHARLES GRAESICKE.

Witnesses:

GEO. T. PINCKNEY,

BERTHA M. ALLEN.