

No. 724,056.

G. J. SCOTT.

PATENTED MAR. 31, 1903.

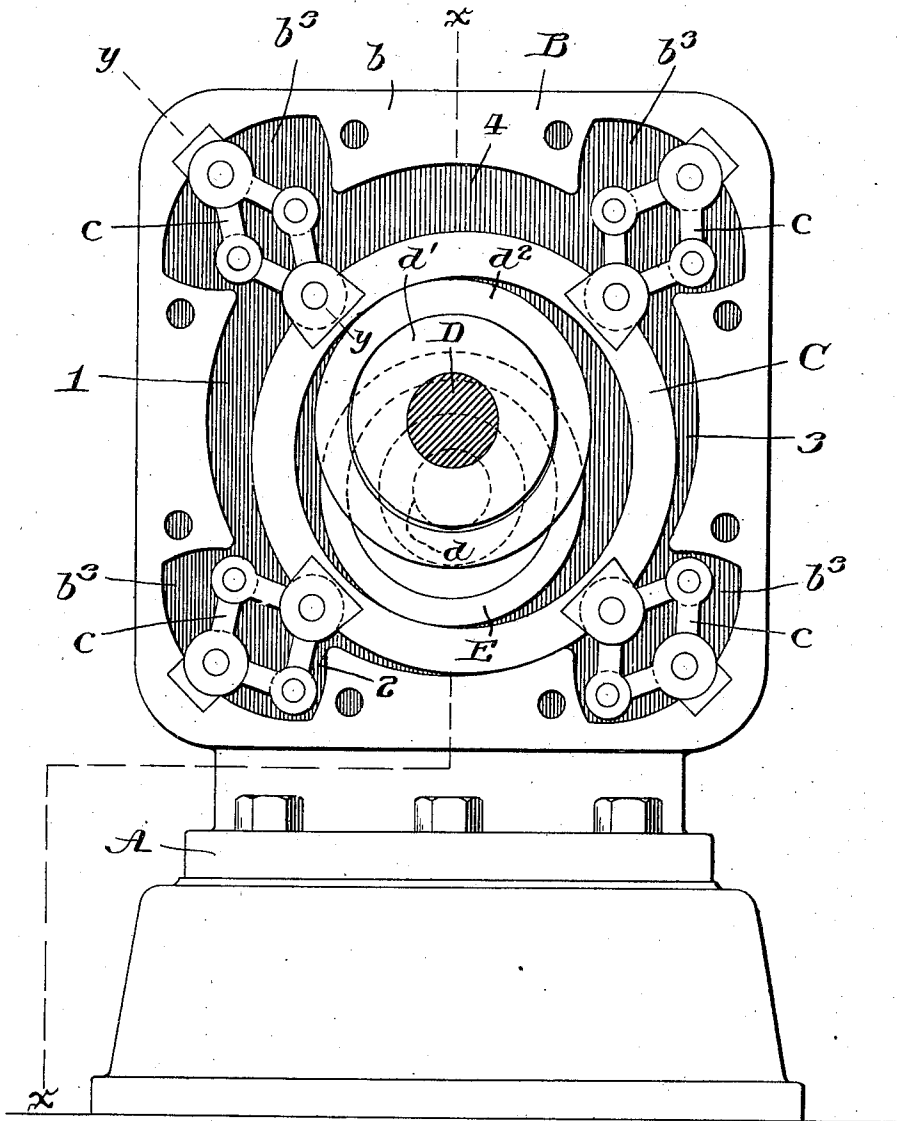
ROTARY ENGINE.

APPLICATION FILED OCT. 2, 1901.

NO MODEL.

3 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:

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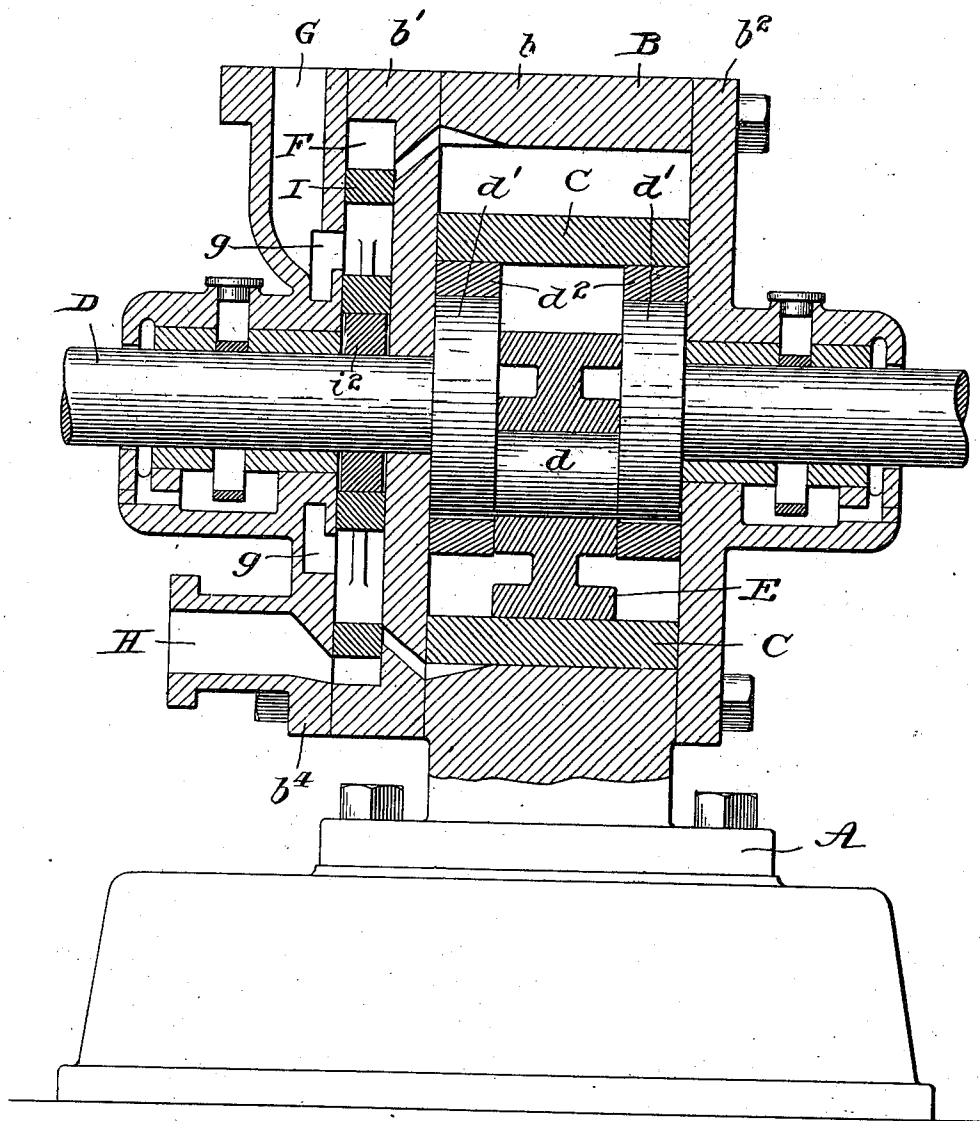
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3 SHEETS—SHEET 2.

Fig. 2.



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3 SHEETS—SHEET 3.

Fig. 3.

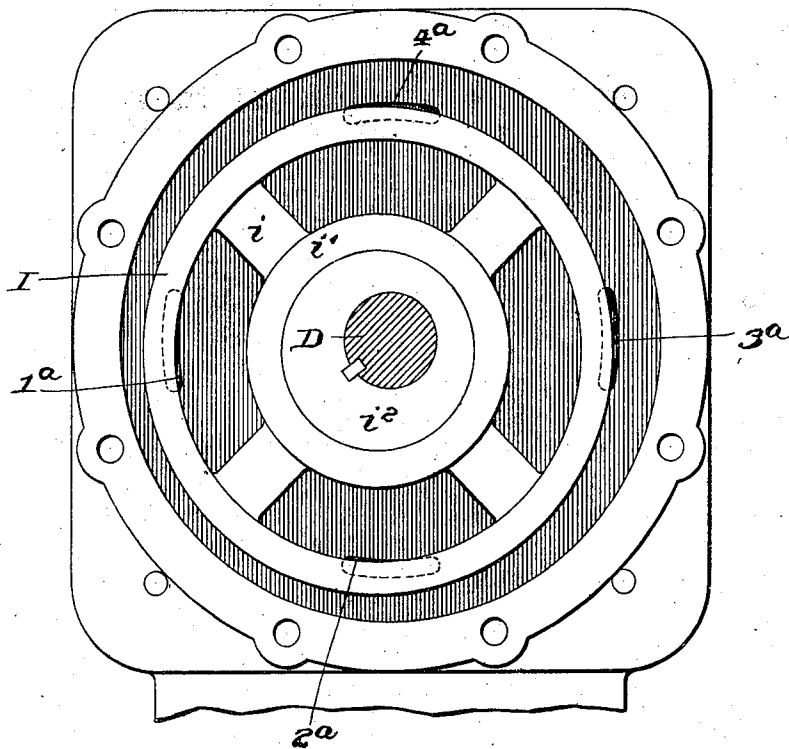
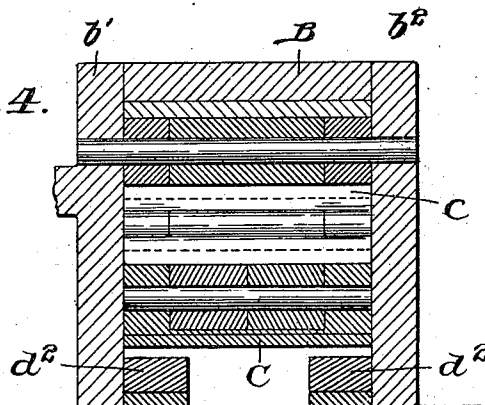


Fig. 4.



WITNESSES:

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UNITED STATES PATENT OFFICE.

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ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 724,056, dated March 31, 1903.

Application filed October 2, 1901. Serial No. 77,274. (No model.)

To all whom it may concern:

Be it known that I, GORDON JOHN SCOTT, a citizen of the United States, residing in the city and county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Rotary Engines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

This invention relates to rotary engines, my object being to provide in this connection a simple and durable construction and organization of mechanism whereby efficient results shall be attained. In the present embodiment of my invention I employ a suitable casing, an annular piston therein, a series of contractible and expansible connections, preferably toggle-levers, between said piston and the inner wall of the casing, said connections being arranged to afford within the casing a plurality of independent compartments, suitably-disposed ports communicating with said compartments, and a valve-ring eccentrically mounted on the engine-shaft and adapted to effect the gradual opening and closing of the ports in succession in a manner to permit the ingress of steam to, its retention in, and egress from the respective compartments at predetermined intervals, and thus to effect the bodily movement of the piston about the said shaft, together with a transmitting device intermediate the piston and the shaft whereby as the piston is actuated power is transmitted therefrom to the said shaft, as will be hereinafter fully set forth and claimed.

In the drawings, Figure 1 is an elevation of an engine embodying my invention, the end plate of the casing being removed to expose the piston and other parts contained within the casing. Fig. 2 is a full transverse section, as on the line xx of Fig. 1. Fig. 3 is an elevation of the valve mechanism. Fig. 4 is a sectional detail through one of the toggle connections, as on the line yy of Fig. 1.

A represents the bed-plate of the engine, and B a casing thereon of suitable shape and size for its intended purpose. In the present instance this casing comprises a hollow body or frame b and two end heads b' b'' . The in-

terior of this body or frame is constructed to form a circular chamber with a series of recesses b^3 at intervals apart. In the illustration there are four of these recesses, the central lines of which radiate from the center of the circular chamber at an angle of forty-five degrees to the horizontal diameter of the latter. Arranged within this circular chamber is an annular piston C, of less diameter than the chamber, which piston is fastened by means of contractible and expansible connections c to the walls of the respective recesses, and thereby yieldingly supported at four points in its circumference. Each connection comprises a pair of oppositely-disposed toggle-levers of sufficient width to extend from side to side of the casing, and hence that portion of the chamber exteriorly of the piston is divided into four compartments, (noted 1, 2, 3, and 4, respectively.) Journaled in suitable boxes exteriorly of the casing is a shaft D, provided with a crank or eccentric portion d and also with two laterally-disposed concentric collars d' . On the eccentric portion is loosely mounted a wheel E, that contacts with the inner periphery of the piston, while on the collars are loosely mounted rings d^2 , that also contact with the inner periphery of the piston at points opposite to that where the loose wheel contacts with the piston.

In one of the heads of the casing are four ports, (noted 1^a, 2^a, 3^a, and 4^a, respectively,) which open into the respective compartments of the chamber and are disposed at equidistant points from the center of the latter. These ports also communicate with a circular chamber F, formed between the head b' of the casing and an end head b^4 , bolted thereto, the latter constituting the steam-chest. In this head are two ports—to wit, an inlet-port G and an exhaust-port H. The inlet-port communicates with an annular passage g on the inner side of the head b^4 , and this passage in turn communicates directly with the chamber F. The exhaust-port leads from the lower portion of the latter chamber. Within this chamber is an annular valve I, having radial arms i and a hub i' , which is loosely mounted on an eccentric i^2 on the shaft D, whereby as the latter is rotated the valve is

eccentrically rotated about the ports to effect the gradual opening and closing of the same in succession. The portion of the chamber F surrounding the outer periphery of the valve communicates with the exhaust-port H, while the portion within the interior periphery of the valve opens into the annular passage in communication with the inlet-port.

The foregoing is a description of the preferred construction of my improved engine. Its operation, briefly described, is as follows: Assuming the parts to occupy the relative positions shown in the drawings, it will be seen that the position of the valve in its rotation is such that the port 1^a is nearly closed preparatory to cutting off the ingress of the steam to the chamber 1, the port 2^a is slightly opened for the initial admission of steam to the chamber 2, the port 3^a, having entirely opened to permit the exhaust of the steam from chamber 3, is closing, and the port 4^a is being opened to permit the exhausting of the steam from the chamber 4. As the valve rotates the several ports are caused progressively to assume these relative conditions indicated, and hence there is steam in two adjacent compartments at all times acting against the opposing surfaces of the toggles and the piston to force the latter away from the wall of the casing, in consequence of which the piston is bodily moved in a path about the axis of the main shaft and in proximity to the circular wall of the casing. The pressure at the point of contact of the piston upon the wheel E effects the rotation of the latter about the inner periphery of the piston, and hence the revolution of the shaft upon which the wheel E is eccentrically mounted. This shaft through the eccentric connection 7² described actuates the valve to control the periodical admission and exhaust of the steam to and from the chambers in the order above indicated.

The purpose of the rings d^2 is to prevent actual contact between the outer periphery of the piston and the frame. There is slight lost motion between the piston and the wheel E, so that the latter will contact with the former at a point immediately rearward of the line of centers of the shaft and wheel. The constant tendency, therefore, is to shorten the distance between the points on the piston where it touches the wheel on one side and where it brings up on the rings d^2 on the other side, thereby maintaining a continuous torque or turning effect about the entire revolution of the shaft.

The valve mechanism is shown herein in a simple and efficient form. It may be adapted to different types of engines by varying the positions of the ports and by changing the radial depth of the valve-ring and the throw of the eccentric.

The rings d^2 may be loose on the shaft, as shown; or they may be integral with the end plates.

It will be noticed that although the motions of the piston and crank are circular, yet they

differ in degree, the motion of the crank exceeding that of the piston. In fact, even though the motion of the piston be fractional the radial throw of the crank may be very great.

I would add that I do not limit myself to the particular details of construction above described, as the same may be modified in many respects without departing from the spirit of the invention.

I claim—

1. In a rotary engine, the combination with a stationary casing, of a piston therein, expandible and contractible connections between fixed points on said piston and casing affording a series of independent compartments, means whereby pressure fluid is introduced to said compartments in prescribed order to act upon the said connections and the piston, a power-shaft, and a transmission device between said shaft and piston.

2. In a rotary engine, the combination with a casing, of a piston therein, toggle connections between said piston and casing affording a series of independent compartments, means whereby pressure fluid is introduced to said compartments in prescribed order to act upon the said connections and the piston, a power-shaft, and a transmission device between said shaft and the piston.

3. In a rotary engine, the combination with a casing, of a piston therein, connections between said piston and casing affording a series of independent compartments, each of said connections comprising a pair of oppositely-disposed toggle-levers, means whereby pressure fluid is introduced to the said compartments in prescribed order to act upon the said connections and the piston, a power-shaft, and a transmission device between said shaft and piston.

4. In a rotary engine, the combination with the casing, of an annular piston therein, expandible and contractible connections between said piston and casing affording a series of independent compartments, means whereby pressure fluid is introduced to said compartments in prescribed order to act upon the said connections and the piston, a power-shaft, and a wheel eccentrically mounted thereon coacting tangentially with said piston.

5. In a rotary engine, the combination with the casing, of an annular piston therein, expandible and contractible connections between the said piston and the casing affording a series of independent compartments, means whereby pressure fluid is introduced to said compartments in prescribed order to act upon the said connections and the piston, a power-shaft provided with a crank portion, and a wheel loosely mounted on said portion and coacting tangentially with said piston.

6. In a rotary engine, the combination with the casing, of an annular piston therein, expandible and contractible connections between said piston and casing affording a se-

ries of independent compartments, means whereby pressure fluid is introduced to said compartments in prescribed order to act upon the said connections and the piston, a power-
 5 shaft, a transmission device between said shaft and piston and a ring or rings on said shaft supporting the piston out of contact with the wall of the casing.

7. In a rotary engine, the combination with
 10 a casing, of a piston therein, expansible and contractible connections between said piston and casing affording a series of independent compartments, a power-shaft, a transmission
 15 device between said shaft and piston coacting tangentially with the latter, ports for the said compartments, a steam-chest, an annular valve for opening and closing said ports, and an eccentric connection between said
 20 valve and the power-shaft.

8. In a rotary engine, the combination with
 a casing in which is formed a circular chamber interrupted by outwardly-extending recesses or offsets at intervals, of an annular
 25 piston in said chamber, toggle-levers arranged within said recesses or offsets and connected to the casing and the periphery of the piston,

so as to form a series of independent compartments about the piston, means whereby pressure fluid is introduced to said compartments in prescribed order to act upon the said
 30 connections and the piston, a power-shaft, and a wheel eccentrically mounted thereon coacting with the said piston.

9. The combination with a casing, of an annular piston therein, expansible and contractible
 35 connections between the said piston and the casing affording a series of independent compartments, means whereby pressure fluid is introduced to said compartments in prescribed order, a power-shaft, and a wheel
 40 eccentrically mounted thereon and contacting tangentially with said piston at a point in rear of the line of centers of the said shaft and wheel.

In testimony whereof I have hereunto affixed my signature in the presence of two subscribing witnesses.

GORDON JOHN SCOTT.

Witnesses:

ANDREW V. GROUPE,
 JOHN R. NOLAN.