

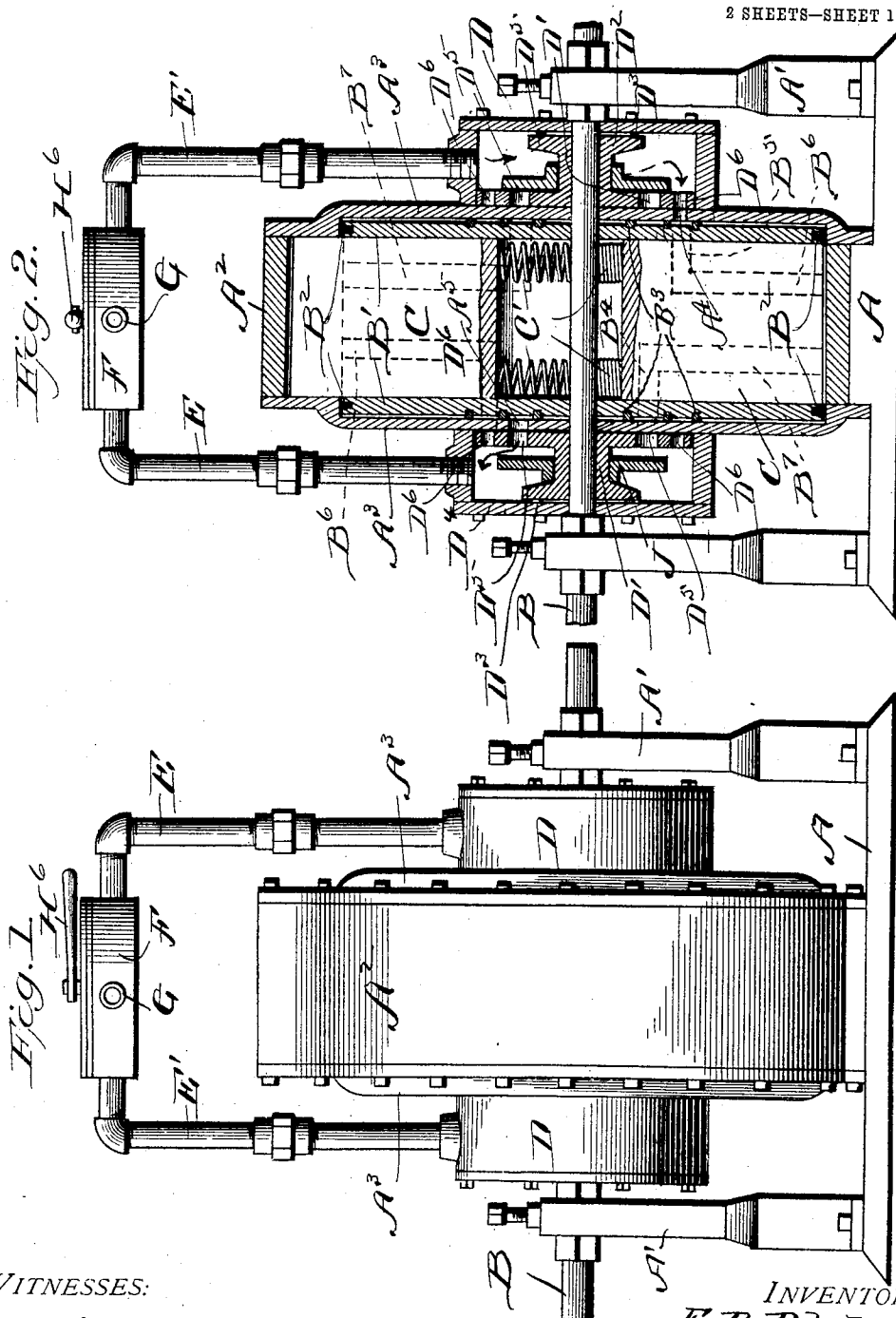
No. 823,252.

PATENTED JUNE 12, 1906.

F. D. BLAKE,
ROTARY ENGINE.

APPLICATION FILED OCT. 10, 1905.

2 SHEETS—SHEET 1.



WITNESSES:

C. H. Walker.
E. B. McBath.

INVENTOR
F. D. Blake.

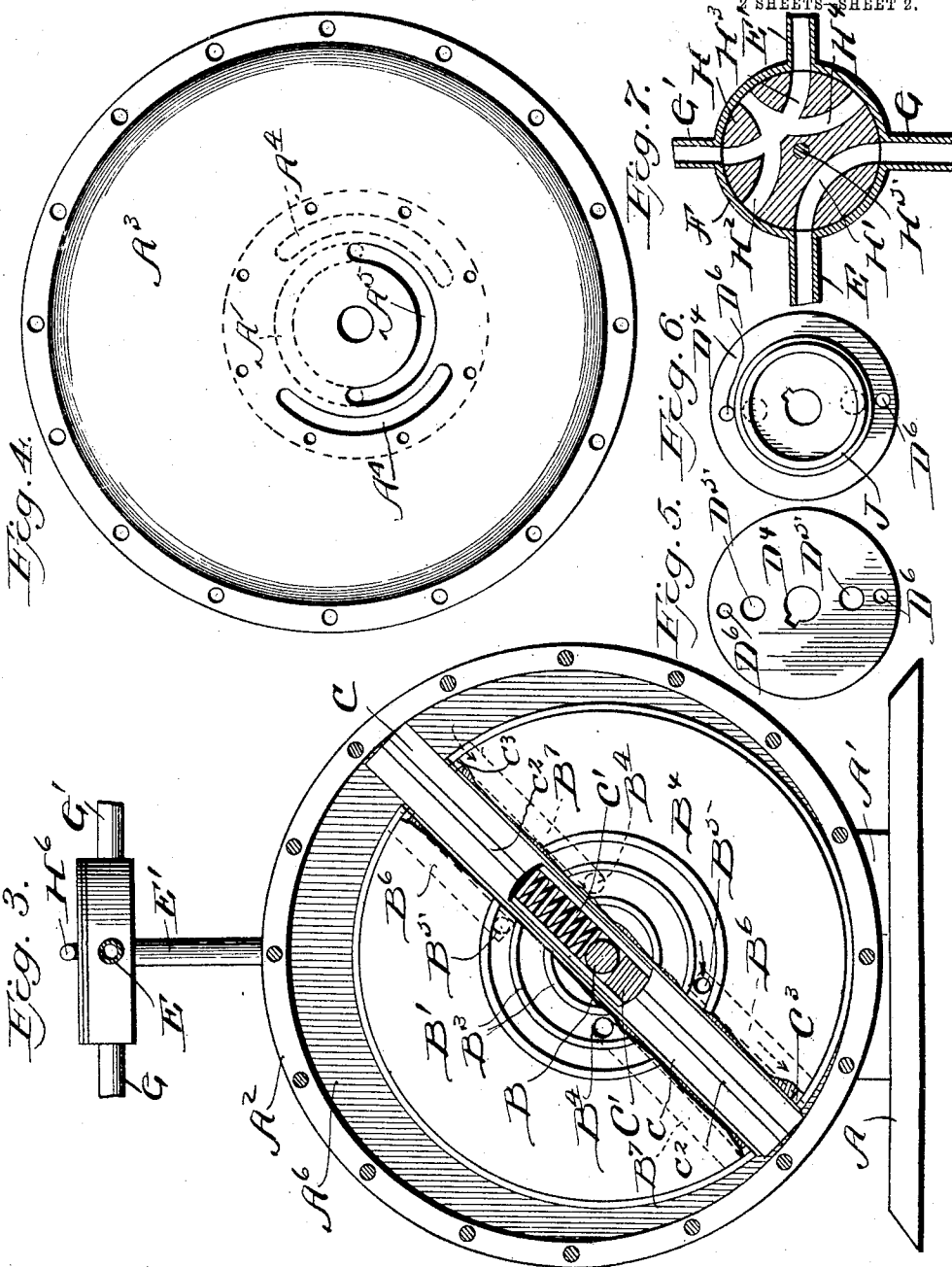
By *O'Neal & Brock*
Attorneys

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UNITED STATES PATENT OFFICE.

FREDRICK D. BLAKE, OF CHESTERFIELD, SOUTH CAROLINA.

ROTARY ENGINE.

No. 823,252.

Specification of Letters Patent.

Patented June 12, 1906.

Application filed October 10, 1905. Serial No. 282,134.

To all whom it may concern:

Be it known that I, FREDRICK D. BLAKE, a citizen of the United States, residing at Chesterfield, in the county of Chesterfield and State of South Carolina, have invented a new and useful Improvement in Rotary Engines, of which the following is a specification.

This invention relates to rotary engines, and has for its object a balanced piston driving, a novel form of valve for controlling the admission of steam to the chamber where the work is performed and for regulating the exhaust from the said chamber, and also an improved starting, stopping, and reversing valve.

The invention consists in the novel forms of construction and combination of parts hereinafter described, shown in the accompanying drawings, and pointed out in the claims.

In the drawings, Figure 1 is an end elevation of my engine. Fig. 2 is a view showing the frame in end elevation and the cylinder, piston, and steam-chests in vertical section, the piston-wings and springs being shown in elevation. Fig. 3 is a side elevation, a cylinder-head being removed. Fig. 4 is a face view of the cylinder-head. Figs. 5 and 6 are opposite face views of a valve-controlling disk. Fig. 7 is a horizontal section through the starting, stopping, and reversing valve.

In the drawings, A represents a suitable base on which are mounted standards A', and on the base between the standards is mounted a cylindrical casing A², having the cylinder-heads A. A rotatable shaft B is journaled in the standards A' and passes loosely through the cylinder-heads A³. In each of the cylinder-heads A a curved slot A⁴ is formed concentric with the shaft B and some distance therefrom. A similar slot A⁵ is also formed in each cylinder-head between the shaft and the slot A⁴, the two slots overlapping slightly, as shown in Fig. 4. The slot A⁴ provides a steam-inlet through the cylinder-head and the slot A⁵ an exhaust. It may be here stated that in operation steam is admitted through the slot A⁴ of one cylinder-head and exhausted through the slot A⁵ of the other.

Within the cylinder A and mounted to rotate with the shaft B is a cylindrical piston B', and it will be noted that the shaft B is offset from the axial center of the cylinder A, but passes through the axial center of the piston B', and the piston B is therefore eccentrically mounted within the cylinder A and contacts with a small portion of the inner face of the

periphery of the cylinder A. The piston is diametrically slotted, and working therein is a centrally-slotted sliding piston-wing C. Springs C' are arranged in the slot of the wing C and upon opposite sides of the shaft B, the inner end of each spring bearing upon the said shaft and the outer end of each spring bearing upon the end of the slot. These springs serve to balance the piston-wing and to cushion its movement as it is moved longitudinally diametrically through the piston B' as the piston rotates upon the shaft B, the springs C' being compressed alternately. A crescent-shaped chamber A⁶ is thereby formed within the cylinder A and is subdivided into two or more compartments as the piston-wing C is rotated with the piston B', the number (two or three) depending on the position of the piston-wing C. On each cylinder-head A² is secured a steam-chest D, through which loosely passes the shaft B. On the shaft and fixed to rotate with the shaft there is in each steam-chest a hub D', flanged at each end, the outer flange D² having a packing-ring D³ in engagement with the outer end of the steam-chest D. The inner flange D⁴, I have shown in detail in Figs. 5 and 6 as removed from the hub D', to which it is suitably keyed when in place, Fig. 5 showing the innerface of the said flange and Fig. 6 the outer face, with a sliding valve shown in the position occupied when the parts are assembled, which valve will be described later. In this flange D⁴ are two diametrically opposite valve-openings D⁵ for the exhaust and D⁶ for the admission of steam. This flange rotates with the hub D' and shaft B and forms the valve controlling the admission of steam into the cylinder A. When the parts are assembled, as shown in Fig. 2, the ports D⁵ will register with the slot A⁵ of the adjacent cylinder-head A² and the ports D⁶ with the slot A⁴.

Steam is passed to and from the chests D through the pipes E and E', which lead to opposite sides of a valve-casing F. Intermediate the pipes E and E' a pipe G leads from the valve-casing F and serves as an exhaust-pipe, and a steam-supply pipe G' leads to the said casing opposite the pipe G. Within the casing is a rotary valve H, a four-way valve having the curved ports H¹, H², H³, and H⁴, the ports H² and H⁴ uniting at the periphery of the valve and the port H³ intersecting the ports H² and H⁴ at the point of juncture. The valve H is provided with a handle H⁵, connected to the stem H⁵. On the hubs D'

are placed sliding ring-valves J, which when moved into contact with the flange D⁴ covers and closes the ports D⁵. In the sides of the piston B' are formed ports B⁴ and B⁵, which communicate with diametrically-extending bores B⁶ B⁷, respectively, (shown in dotted lines in Fig. 3,) which bores open into the chamber A⁶ and always upon opposite sides of their respective piston-wings C. The bores B⁴ and B⁵ aline, respectively, with the slots A⁴ and A⁵, the bore B⁴ being for the exhaust and B⁵ for the admission of steam, the former having the greater diameter. The bores B⁴ and B⁵ are isolated by the interposition of suitable packing-rings B³, carried by the sides of the piston B'. Suitable packing-rings C² and C³ are also provided for the piston-wing C.

In operation it will be assumed that the valve is in the position shown in Fig. 7 and steam will be admitted from the pipe G' to the pipe E'. The exhaust will be through the pipe E, port H', and pipe G. Pressure of steam entering the steam-chest D on the right-hand side as viewed in Fig. 2 will force the ring-valve J along the hub and hold the same in contact with the flange or circular valve D⁴, thus closing the ports or valve-openings D⁵, and steam from the chest D will pass through the port D⁶ as it is brought into alinement with the slot A⁴ and will continue to pass through this port until the end of the slot has been reached. As there are two oppositely-placed ports D⁶, steam will be admitted from the chest D twice during each revolution of the shaft, hub, and valve or flange D⁴. The steam will then be passed in succession through the two ports B⁵, once through each during each revolution of the shaft B and piston B' and through the respective bores B⁶ into the chamber A⁶, where it will expand and drive the piston-wings in the desired direction, the periphery of the casing A² forming an abutment, owing to the piston being mounted eccentrically, as heretofore described. The exhaust will be practically the same as the admission, but in the opposite direction, for in the other chest D the ring-valve J will be forced away from the valve D⁴ and the exhaust-ports D⁵ in that valve uncovered. By throwing the valve-handle H⁶ through an eighth of its revolution steam will be admitted into both pipes E and E' and the wing C balanced on each side and the engine stopped. By throwing the valve-handle through one-fourth of a revolution the engine will be reversed, steam being admitted through the pipe E and exhausted through the pipe E'.

Having thus fully described my invention,

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

1. In a rotary engine, steam-chests, a shaft passing through the chests, a cylindrical casing, a rotary piston having a movable wing mounted on the shaft, the said casing having slots on each side concentric with the shaft, a hub in each chest and fixed to the shaft, a flange on said hub contacting with the casing and covering the slots, ports in the flange adapted to aline with the slots, a sliding ring on the hub adapted to cover the ports alining with one of said slots, and means for admitting steam into the said chests.

2. The combination with a rotary engine of a steam-chest, the engine-shaft passing loosely through said chest, a hub in the chest fixed to the shaft, a flange on the hub having inlet and exhaust ports adapted to aline with similar ports of the engine, a ring adapted to slide on the hub and cover the exhaust-ports, a pipe leading to said chest, and a valve adapted to admit or exhaust steam through the said pipe.

3. In a rotary engine, a casing, a shaft passing eccentrically through the casing, a piston thereon, a sliding wing carried by the piston, a steam-chest on each side of the casing, the casing having slots concentric with the shaft and with respect to each other, said slots overlapping and giving communication with the interior of the steam-chests, a rotary valve in the chest having ports adapted to aline with the slots, a sliding valve adapted to close the ports alining with one of the slots, a valve-casing, a steam-pipe leading thereto, an exhaust-pipe, a pipe leading from each of the steam-chests to the valve-casing, and a four-way valve in said valve-casing.

4. The combination with a rotary engine comprising a cylinder having slotted cylinder-heads and a rotatable shaft, the slots being concentric with each other and the shaft, steam-chests on the cylinder-heads and covering the slots, the shaft passing loosely through the said chests, a hub in each chest fixed on the shaft, inner and outer flanges on each hub, the inner flange having ports adapted to aline with the slots, a packing-ring on the outer flange, a ring sliding on the hub between the flanges and adapted to cover the ports alining with one of the slots, and means for admitting or exhausting steam through the said chests, as and for the purpose set forth.

FREDRICK D. BLAKE.

Witnesses:

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A. C. DOUGLASS.