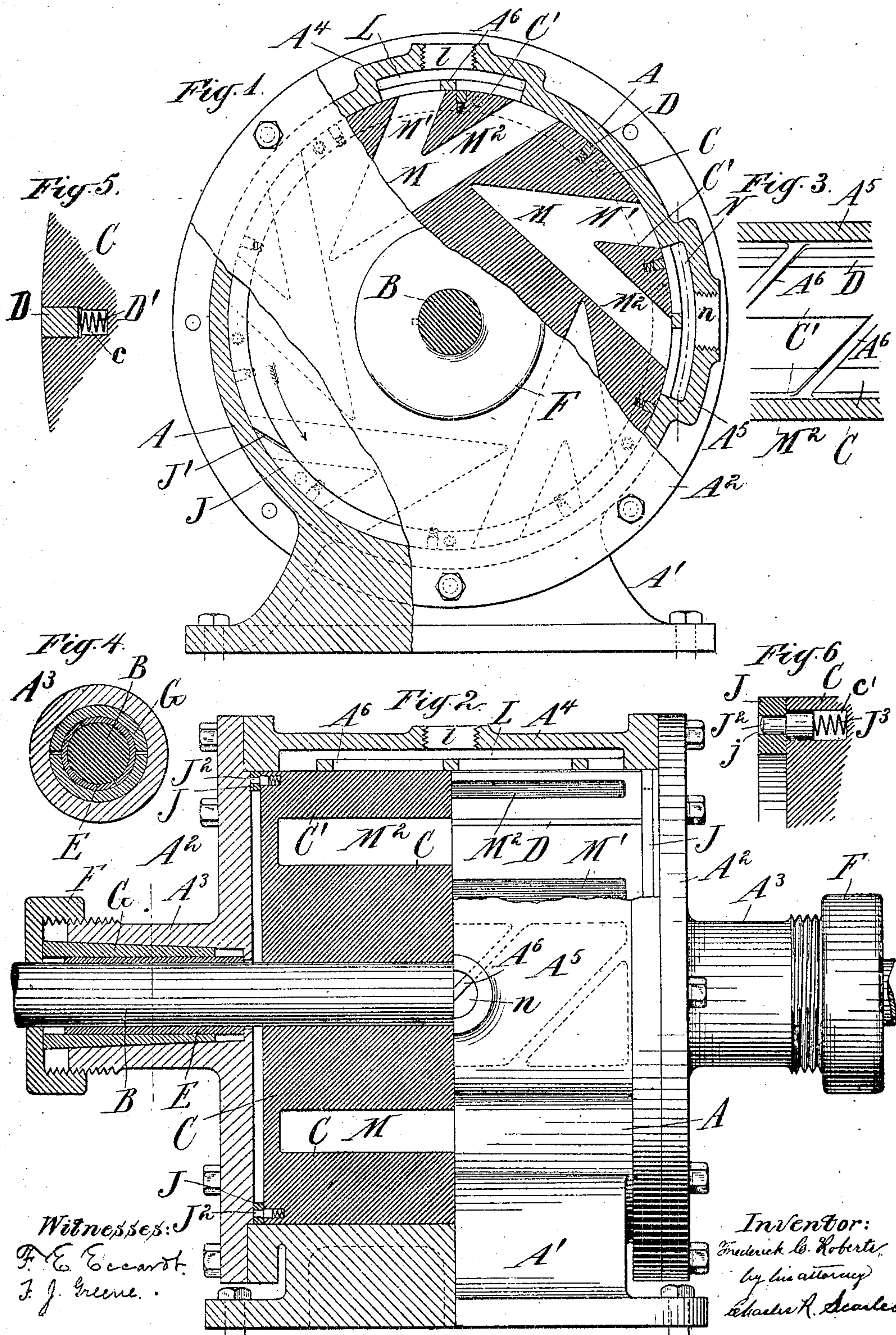


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F. C. ROBERTS.
STEAM TURBINE.

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Witnesses:
F. E. Eccardt.
J. J. Greene.

Inventor:
Frederick C. Roberts
by his attorney
Charles R. Seales

UNITED STATES PATENT OFFICE.

FREDERICK C. ROBERTS, OF PATERSON, NEW JERSEY, ASSIGNOR TO SAID
ROBERTS AND BERTRAM D. McKENZIE, OF RUTHERFORD, NEW JERSEY.

STEAM-TURBINE.

No. 849,699.

Specification of Letters Patent.

Patented April 9, 1907.

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To all whom it may concern:

Be it known that I, FREDERICK C. ROBERTS, a citizen of the United States, residing at Paterson, in the county of Passaic and State of New Jersey, have invented a certain new and useful Improvement in Rotary Engines or Steam-Turbines, of which the following is a specification.

The invention relates to engines of the turbine or reaction class; and its object is to provide a simple, inexpensive, and efficient steam-motor.

The invention consists in certain novel features of arrangement and details of construction by which the above objects are attained, to be hereinafter described.

The accompanying drawings form a part of this specification and show the invention as it is intended to be carried out in practice.

Figure 1 is a side view, partly in vertical section. Fig. 2 is a front view, partly in vertical section. Fig. 3 is an elevation of certain portions, partly in vertical section, the line of section being indicated at the right in Fig. 1. Fig. 4 is a vertical section through one of the shaft-bearings, taken on the dotted line at the left in Fig. 2. Fig. 5 is a section showing in detail, on a larger scale, one of the packing-strips in its groove, and Fig. 6 is a corresponding section through one of the packing-rings and adjacent portion of the piston.

Similar letters of reference indicate the same parts in all the figures.

The engine is of the rotary piston type, steam being admitted to pockets in the piston at one point in its circumference and exhausted at another.

A is a cylindrical casing having a base A^1 cast in one therewith and provided with close-fitting heads $A^2 A^2$, bolted to the cylinder ends. The heads are similar and each carries a central tubular extension A^3 , serving as a bearing for the shaft B, extending axially through the casing and from which power is transmitted, as usual, through a pulley or otherwise.

C is a cylindrical casting or piston having a diameter matching to that of the interior of the casing A in which it is received and keyed to the shaft B to compel the latter to turn therewith. The piston is provided with a number of equally-spaced pockets or chambers M, preferably of triangular form in cross-

section, extending nearly the full length of the piston and divided each into two channels $M^1 M^2$ at the periphery by a longitudinal bar C' , cast in one with the piston.

On the upper face of the casing A is a swell A^4 , the hollow interior of which serves as the steam-port, (marked L,) and a similar swell at the front forms the exhaust-port N. Both ports extend the full length of the pockets and are nearly as wide as the latter. Openings l and n receive the steam and exhaust pipes respectively.

The piston revolves in the direction shown by the arrow and presents the channel M^1 to the steam-port, filling the pocket with steam under pressure. As the piston turns the channel M^1 is covered, but the steam continues to act through the channel M^2 , which is then presented to the steam-port. Before the channel M^2 moves forward sufficiently to be covered by the casing beyond the port the next succeeding channel M^1 is presented and its pocket similarly acted upon by the steam. The pockets exhaust in the same manner on successively reaching the exhaust-port.

The cylindrical face of the piston is packed by metal strips D, lying parallel with the axis in close-fitting grooves planed in the body of the piston and in the bars C' , and the strips are held in yielding contact with the interior surface of the casing by springs D' , seated in recesses c beneath the strips. To facilitate the smooth travel of the strips across the ports L and N, the latter are cast with narrow bridge-pieces $A^6 A^6$, having their inner faces coinciding with the curved interior of the casing.

J J are metallic rings of rectangular section interposed between the ends of the piston and the heads $A^2 A^2$ in the annular angle formed by the latter with the casing A, serving to prevent the escape of steam across the ends of the piston. These rings are cut, as at J' , and tend to expand circumferentially against the inner face of the casing. They are joined to the piston by pins J^2 , loosely received in but not extending through holes j in the rings and having bodies of larger diameter matching to recesses c' in the ends of the piston, in each of which is a spring J^3 , tending by means of the shoulder on the body to force the ring into close contact with the interior face of the adjacent head.

The shaft is supported on split cylindrical bushings E in the long bearings A³, and any changes in axial position of the shaft relatively to the casing due to wear of the bushings is taken up by the endwise movement of tapered split sleeves G G, inclosing the bushings and extending beyond the outer ends thereof, where they abut against the inner faces of annular screw-threaded caps or followers F F, encircling the shaft and engaged with threads on the exterior of the tubular bearings. By this means the sleeves may be forced inwardly, and by the action of their tapered surfaces upon the similarly-shaped interior surfaces of the bearings A³ the bushings may be adjusted to bring the shaft to the central position. At the inner ends the bushing abuts against the bottom of the recess in which the sleeve, and bushing are received and inward movement of the latter is thus prevented.

Modifications may be made in the forms and proportions of the parts, and there may be a greater or less number of pockets. Two or more steam-ports may be employed, together with a like number of exhaust-ports alternately arranged and spaced as desired.

Exhaust-steam from one engine may be led to the steam-port of another and the engines thus compounded.

I claim—

1. A cylindrical casing having a steam-port and an exhaust-port arranged peripherally therein, a cylindrical rotary piston matching to and received in said casing, a series of pockets in said piston, and a bar dividing each of the pockets into two channels at the periphery of said piston.

2. A cylindrical casing having a steam-port and an exhaust-port arranged peripherally therein, a cylindrical rotary piston matching to and received in said casing, a series of pockets in said piston, a bar dividing

each of said pockets into two longitudinal channels at the periphery of said piston, and longitudinally-extending packing-strips in said bars and in said piston between said pockets.

3. A cylindrical casing having a steam-port and an exhaust-port arranged peripherally therein, heads for said casing, a cylindrical rotary piston matching to and received in said casing, a series of pockets in said piston, a bar dividing each of said pockets into two longitudinal channels at the periphery of said piston, packing-rings between said heads and the ends of said piston, recesses in said ends, pins in said recesses extending into holes in said rings, shoulders on said pins engaging said rings, and springs in said recesses behind said pins.

4. A cylindrical casing having a steam-port and an exhaust-port arranged peripherally therein, heads for said casing, a cylindrical rotary piston matching to and received in said casing, a series of pockets in said piston, a bar dividing each of said pockets into two longitudinal channels at the periphery of said piston, tubular bearings on said heads, a shaft extending axially of said casing through said bearings and carrying said piston, an annular tapered recess in each of said bearings, a cylindrical split bushing in said recess and inclosing said shaft, a tapered split sleeve matching said recess and inclosing said bushing, and a follower on each of said bearings in engagement with said sleeve and adapted to move the latter axially and thereby center said bushing.

In testimony that I claim the invention above set forth I affix my signature in presence of two witnesses.

FREDERICK C. ROBERTS.

Witnesses:

CHAS. A. HAUCK,
CHARLES R. SEARLE.