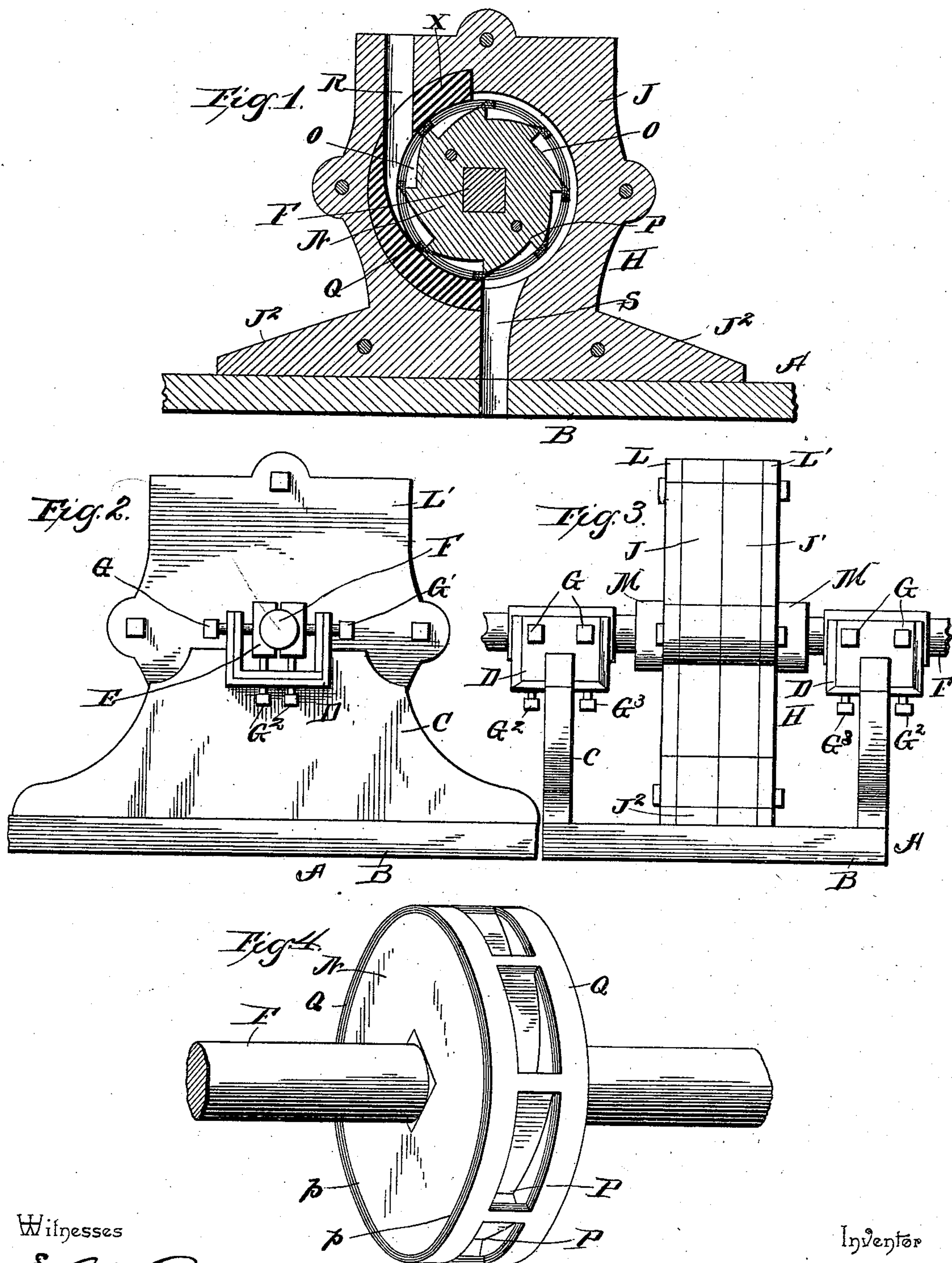


(No Model.)

W. M. BYRD.
ROTARY STEAM ENGINE.

No. 501,598.

Patented July 18, 1893.



Witnesses

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WALTER MOSELY BYRD, OF MOUNT GILEAD, NORTH CAROLINA, ASSIGNOR
OF ONE-HALF TO ARCHIBALD D. CLARK AND WILLIAM D. CLARK, OF
SAME PLACE.

ROTARY STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 501,598, dated July 18, 1893.

Application filed July 8, 1892. Serial No. 439,399. (No model.)

To all whom it may concern:

Be it known that I, WALTER MOSELY BYRD, a citizen of the United States, residing at Mount Gilead, in the county of Montgomery and State of North Carolina, have invented a new and useful Rotary Steam-Engine, of which the following is a specification.

My invention relates to steam engines, and in particular to that type known as rotary engines in which the impact or pressure of the steam from the inlet port is directed tangentially against a series of relatively arranged steam cups or buckets peripherally circumscribing the tread of a cylinder mounted rigidly on a rotatable main shaft running through and suitably journaled in a steam cylinder.

My invention has for its objects to simplify the construction by dispensing with useless parts, to reduce friction and vibration to a minimum, and to increase the efficiency and power translated.

For the attainment of the several objects my invention consists, in brief, in certain details of construction, arrangement and combination of parts all of which will be more fully described hereinafter, and the specific points of novelty in which will be designated in the appended claim.

Before proceeding farther into a detailed description of the several auxiliary features of my invention, I desire to here distinctly state and emphasize the fact that although I have shown in the accompanying drawings, and described in the following specific description certain component and co-operating parts which I deem sufficiently improved and operative to carry out the fundamental principles herein incorporated, however, I do not confine myself to the exact details of construction so illustrated and described since obvious departures may be made without deviating from the inherent and generic features constituting the gist hereof.

Referring to the accompanying drawings:—
Figure 1 is a longitudinal vertical section through the steam cylinder. Fig. 2 is a side elevation. Fig. 3 is an end elevation. Fig. 4 is a detail view of the main shaft and its attached cylinder.

Like letters of reference indicate like or corresponding parts in all the figures of the drawings.

A indicates a suitable foundation or frame for the engine consisting of a base plate B and the two vertical bearing brackets C, C, extending upwardly therefrom on each side as shown clearly in Fig. 3. The upper portion of each bearing bracket C is provided with a rectangular recess or slot in which is rigidly placed the U-shaped or slotted journal bearing box D which in turn supports, by means of set screws more fully described hereinafter, the sectional journal bearing blocks E made of suitable anti-friction metal and formed in two halves or sections as shown clearly in Figs. 2 and 3 embracing the main shaft F which extends transversely across from bearing to bearing and revolves loosely therein. The said shaft is rendered vertically and horizontally adjustable in the bearing box D by means of the set screws G, G', G², and G³, severally passing through perforations in the sides and bottom of the journal box D and bearing in pairs on the bottom and two sides of the bearing E, which is held out of contact with the journal box D by means of set screws. The pair of set screws G and the pair G' serve to adjust and hold the main shaft F transversely of its axis, while the two sets G² and G³ are for the purpose of vertically elevating and lowering the same.

The function and operation of the adjustment of the main shaft will be more fully explained hereinafter in their proper places.

H designates the steam cylinder consisting of the main casing J comprising the laminae or two plates J, J' bolted together in the manner shown and interiorly provided with coincident circular perforations approximately equal in diameter to that of the rotatable steam drum N rigidly keyed to the main shaft on the inside of the steam cylinder. Each plate J, J' has an integrally formed base plate or wing J² bolted to the base plate B; and L, L' respectively designate the face plates covering the steam cylinder laterally on both sides and serving to render the same steam, air, and water tight, being provided with a stuffing box M, through which the shaft F

passes. This stuffing box is packed with suitable packing rings or other devices for preventing the escape of steam from around the main shaft through the orifice.

5 N is the steam drum rigidly keyed on the main shaft F and comprising two juxtaposed disks bolted together and having their unit tread or periphery provided with a series of succeeding steam cups or buckets O formed
10 in said periphery by curved shouldered recesses tapering, or dipping from the plane of the tread obliquely downward and ending abruptly in an angular shoulder P which is the boundary line between the deepest point
15 of one bucket to the initial or shallow point of the next succeeding bucket.

On each side of the series of steam cups O, O and circumferentially around the drum N is placed the concentric ring or packing Q
20 consisting of anti-friction metal next to the drum N and superposed packing of any approved material outside thereof and extending circumferentially around each side of the steam cups, and transversely between the
25 same. By reference to Fig. 4 of the drawings particularly, it will be seen that the packing ring Q and the superposed packing thereon, are cut out of a single blank of the packing material, so as to be provided with a series
30 of rectangular openings which register with the top peripheral edges of the steam buckets O. By forming the ring or packing Q of a single blank of material, a peripheral packing is not only provided for the top and
35 side edges of the drum and transversely between each cup or bucket, but a packing is provided which on account of being made out of a single blank is not likely to become impaired in parts, as would necessarily be the
40 case if made up of several sections.

Steam is admitted to the cylinder H through the upper vertical inlet port R extending down through the top of said cylinder and communicating with the interior by an impact
45 recess in the lateral circular wall of the same which recess is the terminal of the inlet port and is concaved and arc shaped as shown corresponding to the curve of the drum N and approximately coextensive with the length or
50 extent of any two adjacent buckets O, or in other words is so shaped and situated as to discharge the impact of the steam descending through the inlet port R tangentially and continuously against two adjacent registering
55 steam buckets at the same time, whereby the said impact or pressure of the steam is applied simultaneously on a tangential line to two steam buckets O, O with equal force or leverage, such impact or pressure continuing
60 until one of said steam cups has passed down beyond the operating point of the inlet port, and the steam thereby cut off from that bucket and applied to the next adjacent following set, and further that when the steam
65 enters the buckets it is completely housed until it reaches the exhaust port, thereby providing a construction in which two buckets

are continuously, without a moment's intermission, under the impact of live steam, while one bucket at a time exhausts. 70

As will be observed one-half of the interior circular wall of the steam cylinder H through which the steam enters is provided with an enlarged removable semi-circular packing
75 ring or abutment X, seated in the side of the cylinder so that its inner face projects into the same and therefore has a shorter radius than the other corresponding opposite half of the cylinder, that is to say, one half of the periphery of the steam drum N rotates in close
80 contact with projecting packing on one side of the steam cylinder wall, while the other half has an exhaust or open space concentrically therearound, the latter space being the exhaust chamber and having the exhaust port
85 S extending from the bottom thereof through the base plate and foundation of the structure. The semi-circular packing abutment X, which projects into the cylinder at one side of the same, crosses the lower end of the steam
90 inlet port and is bored to register therewith and to form with the interior circle of such abutment an arc shaped impacting recess, which always covers two of the side inclosed
95 buckets of the steam drum or piston, which closely contacts with the packing abutment. Means are therefore provided for constantly filling two buckets at a time with live steam, and as each bucket filled with the live steam
100 passes below the impacting recess, the steam is completely housed until such bucket leaves the lower end of the packing abutment and reaches the bottom exhaust port. This construction and specific arrangement of impact-
105 ing and exhausting the steam buckets, further provides means whereby whatever friction the steam might otherwise make against the packing is cut off. Now it will be apparent that the single blank peripheral packing
110 of the steam drum, serves to insure a perfectly steam tight joint, together with the packing abutment X, against which such packing bears, and thereby serves to form inclosing packing for each separate indented
115 bucket, and thereby confine the steam therein until the exhaust is reached. It will be seen that the peripheral packing Q, contacts only with the semi-circular abutment of the cylinder, and does not touch the sides of the cylinder in the half opposite said packing abut-
120 ment.

The relative position and co-operation of the steam packing ring around the drum N, with the sides of the steam cylinder, and the adjustment of the steam buckets with relation
125 to the inlet and exhaust ports can be regulated at will by means of the set screws G, G', G², G³, respectively at both ends of the main shaft, thus providing efficient means, whereby the steam cylinder may be rendered steam
130 tight and the steam buckets adjusted properly at required times in order to utilize and direct the full force or impact of the steam thereagainst.

The angle at which the steam presses against the tangential line or leverage of the drum, and the continuous successive pressure taken in conjunction with the manner in which the steam is automatically cut-off at a predetermined point, and the whole made absolutely steam and water tight are an essential feature and component part of this invention.

By means of my improvement all exterior machinery is dispensed with, besides the use of a piston, follow head, connecting rod, cross head, slides, eccentric, and shifting valve, and the friction incident upon the use of such devices is entirely done away with.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

In a rotary engine, the combination of a steam cylinder having a side inlet and an opposite exhaust port, said cylinder being further provided with a circular steam chamber or recess, a semi-circular packing abutment seated in one side of said chamber or recess and projecting therein to form a piston or drum abutment and an opposite exhaust space between its ends, said packing abutment be-

ing bored to register with the inlet and having its lower end terminating in a line with the exhaust port, a steam drum mounted concentrically in the cylinder and provided with a peripheral series of indented or dipping side-inclosed steam buckets, superposed packing extending circumferentially around the steam drum and comprising a single blank of packing material having a series of rectangular openings registering with the top peripheral edges of the steam buckets so as to extend circumferentially around each side of the same and transversely there-between, said single blank packing being adapted to contact with said packing abutment, and to travel out of contact with the sides of said steam chamber or recess opposite said abutment, substantially as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

WALTER MOSELY BYRD.

Witnesses:

J. M. DEATON,
G. N. SCARBORO.