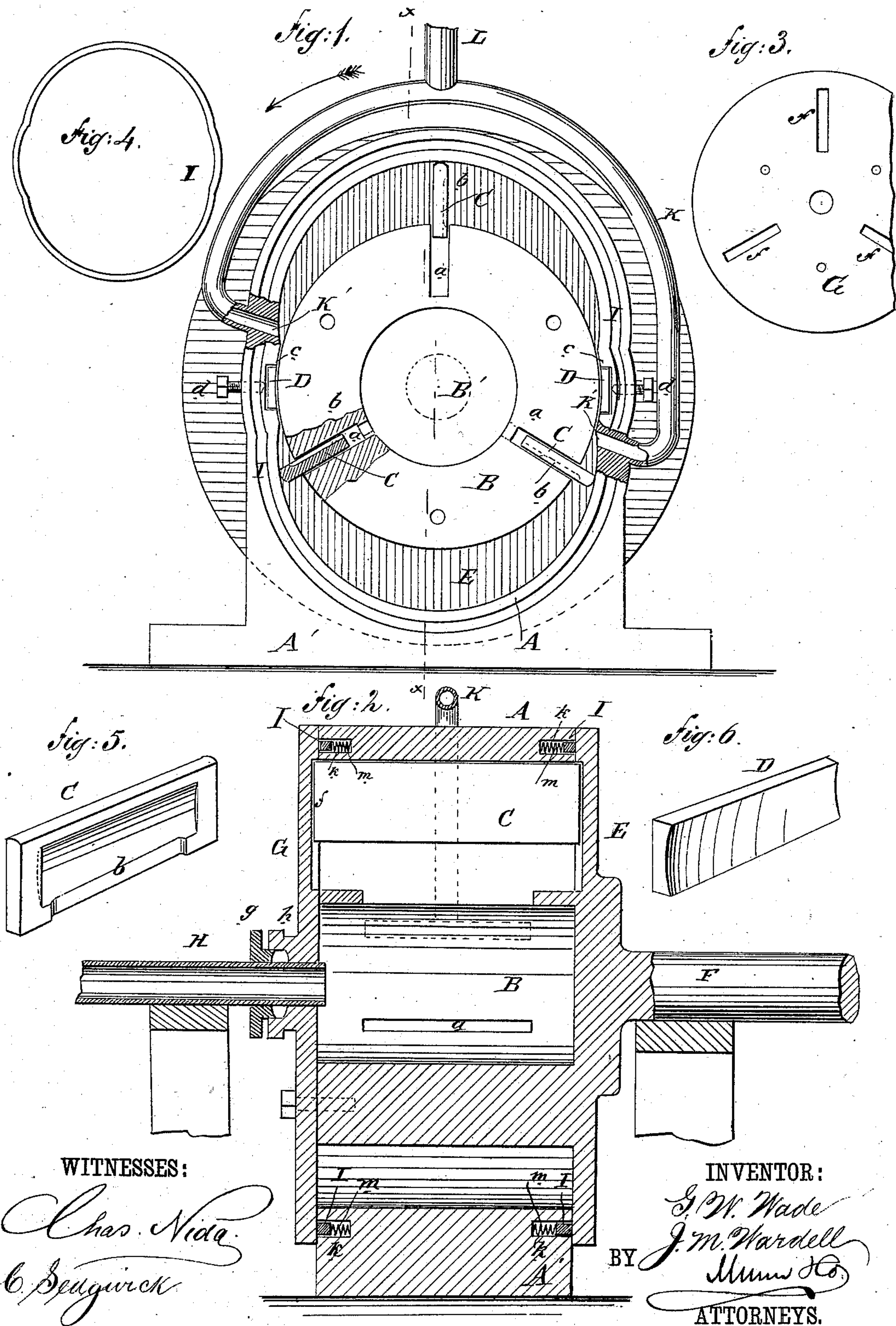


(No Model.)

G. W. WADE & J. M. WARDELL.
ROTARY STEAM ENGINE.

No. 254,737.

Patented Mar. 7, 1882.



WITNESSES:

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UNITED STATES PATENT OFFICE.

GEORGE W. WADE AND JOSHUA M. WARDELL, OF CADILLAC, MICHIGAN.

ROTARY STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 254,737, dated March 7, 1882.

Application filed June 30, 1881. (No model.)

To all whom it may concern:

Be it known that we, GEORGE W. WADE and JOSHUA M. WARDELL, of Cadillac, in the county of Wexford and State of Michigan, have invented a new and Improved Rotary Steam-Engine, of which the following is a specification.

The object of this invention is to construct a cheap and durable engine and to economize steam in the application of power.

The invention will first be described in connection with the drawings and then pointed out in the claim.

Figure 1 is an end elevation of the engine, with a head removed and with parts broken away to exhibit other parts. Fig. 2 is a vertical sectional elevation of the same on line *x x*, Fig. 1. Fig. 3 is a reduced front elevation of a cylinder-head. Fig. 4 is a reduced elevation of a packing-ring. Fig. 5 is a perspective view of a valve. Fig. 6 is a perspective view of a wearing-plate.

Similar letters of reference indicate corresponding parts.

In the drawings, A represents the outer case or shell, supported on a suitable base, A', said case A being of ellipsoidal cross-section, longest in its vertical diameter and drawn in at the sides to the diameter of the revolving cylinder B. Set centrally within this case A is a hollow cylinder, B, whose center B' serves as the steam-chest. Said cylinder B is provided with three radial slots or valve-seats, *a*, at equal distances apart, reaching nearly from one end to the other of the cylinder and from the interior B' to the periphery; and said slots *a a* contain the valves C C, that, when the engine is in operation, are forced outward by the steam in the center B'. When closed the outer edges of said valves C C are flush with the periphery of the cylinder B, and the diameter of the said cylinder B is but a little less than the least internal diameter of the case A. These valves C C are cut away, as shown at *b*, on one face and edge, for about two-thirds their length only, to make them cut off when closing just before the exhaust.

Opposite each other in the inside of the case A, at the narrowest part thereof, are formed recesses *c c*, in which are concave packing-strips D, that are adjusted out against the

cylinder B, with any desired pressure to make tight joints, by set-screws *d d*.

One end of the case A is closed by a circular head, E, that is preferably cast on and made part of the cylinder B, and from the center of this head E projects the horizontal driving-shaft F, for transmitting the motion of the engine. The opposite end of the case A is closed by a circular head, G, that is bolted on the end of the cylinder B, and has formed in its inner face radial depressions or sockets *f*, for the reception of the ends of the valves C C. Through a stuffing-box, *h*, and gland *g* the steam-supply pipe H is entered through the head G into the cylinder B.

In suitable recesses, *k*, formed in the ends of the case A, are fitted packing-rings I, that are held out against the heads E G by springs *m*, as shown in Fig. 2, whereby tight joints are made between case A and cylinder-heads E G.

K K represent the exhaust-pipes of the engine, extending from the opposite ports K' K' in the sides of the case A to a common pipe, L.

In operating this engine, steam entering through supply-pipe H into the cylinder B maintains a constant pressure upon the inner edges of the valves C C, and keeps their outer edges in contact with the case A, and forces them gradually outward in turn as they pass the packing-strips D; and when a valve C has been raised or forced out a certain distance—to the outer point of its depression *b*—the steam escapes on the depressed side of said valve C into the case A, and, pressing between a point of contact between cylinder B and case A and the said valve C, revolves said cylinder B until said valve C reaches, or nearly reaches, an exhaust-port, K', where said valve C, which has been gradually forced inward after passing the central perpendicular line of the engine, is closed sufficiently to cut off the escape of steam from the cylinder B and to permit the steam that has done the work to escape through the said port K'; and in this manner the valves or pistons C C alternately operate, one valve or piston C always pushing out, and for most of the time two; and as the outward pressure on the valves C C is continuous, and as the steam is simultaneously taken in the upper and lower steam-spaces of the casing A, the cylinder B is, as it were, balanced in steam;

hence there is no appreciable side pressure on its journals.

Having thus fully described our invention, we claim as new and desire to secure by Letters
5 Patent—

In a rotary engine, the case A, made longest on its vertical diameter, drawn in at the sides, having recesses c, and provided with heads E G, in combination with the radially-slotted

cylinder B, having a steam-chest at its center 10 B', the cut-away valves b C, and the packing-strips D, arranged in said recesses c of the case, whereby the engine operates as described.

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Witnesses:

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