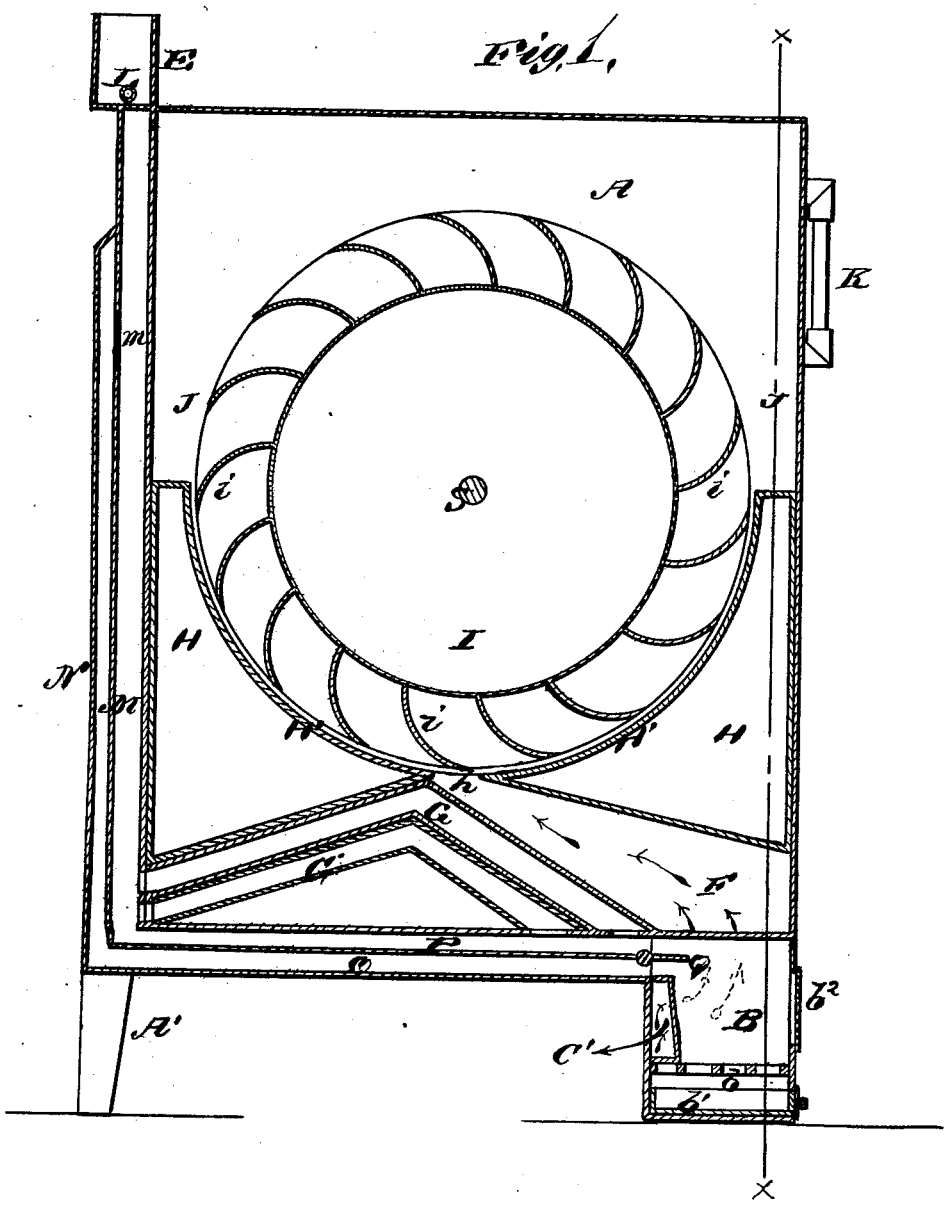
2 Sheets—Sheet 1.

T. F. SPARROW.

ROTARY ENGINE.

No. 190,923. Patented May 15, 1877.

Fig. 1.



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2 Sheets—Sheet 2.

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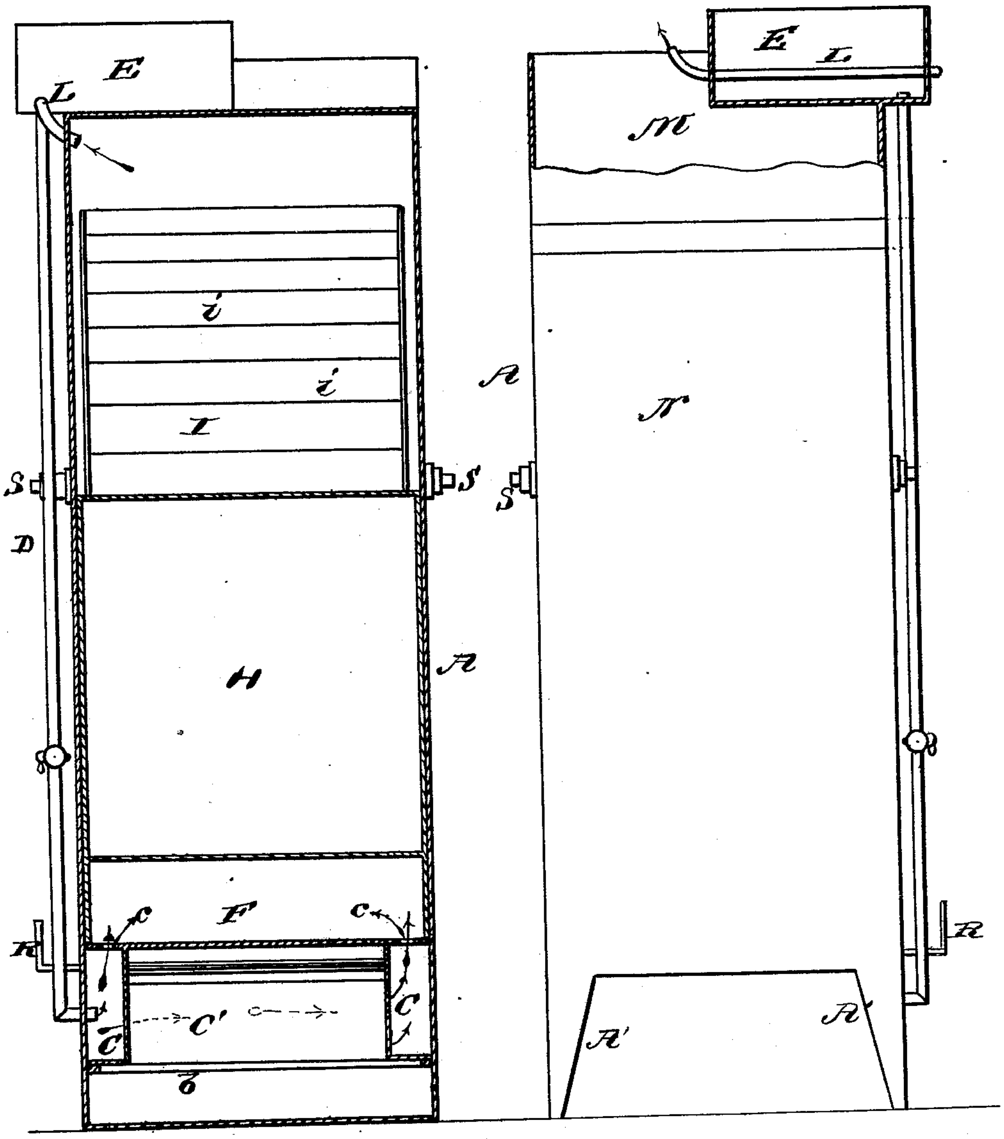
Fig. 2, Fig. 3,



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UNITED STATES PATENT OFFICE.

THOMAS F. SPARROW, OF DENVER, COLORADO.

IMPROVEMENT IN ROTARY ENGINES.

Specification forming part of Letters Patent No. **190,923**, dated May 15, 1877; application filed March 31, 1877.

To all whom it may concern:

Be it known that I, THOMAS F. SPARROW, of Denver, in the county of Arapahoe and State of Colorado, have invented a new and valuable Improvement in Steam-Engines; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, and to the letters and figures of reference marked thereon.

Figure 1 of the drawings is a longitudinal vertical sectional view, and Fig. 2 is a transverse vertical sectional view, of my steam-engine; and Fig. 3 is a side elevation, part sectional, of the same.

The object of this invention is to provide an apparatus for operating a wheel by the combined action of water and steam, substantially as hereinafter set forth.

In the accompanying drawings, A designates the rectangular upright external casing of my apparatus, which is supported at one end by short legs A′ A′, and at the other end by the bottom of furnace B. Said furnace has a grate, *b*, an ash-pan, b^1, and a door, b^2, for admitting fuel. The ends of said furnace are provided with double walls, forming receptacles C C, that are connected at the rear by a transverse space or boiler, C′, and supplied with water by a pipe, D, from a tank, E, on the top of said external casing A. Said spaces C C C′ in the double walls of said furnace communicate with a chamber, F, above the same by small openings *c*. These chambers C, C′, and F together constitute the boiler of the engine. Said chamber F is partly formed by the walls and bottom of said outer casing A, partly by a portion of the upper wall of an inverted V-shaped passage or flue, G, and partly by one part of the V-shaped bottom of a case or steam-guide, H. Said chamber F is inclined and tapered upward and inward, so as to discharge the steam through a contracted opening, *h*, in the lowest part of the concave upper face H′ of said guiding-case H.

I designates a horizontal wheel, having buckets *i*, and turning in a water-chamber, J, in the upper part of said external casing A. The curved upper face H′ of casing H sets close to the lower part of said wheel, and guides the steam passing up through passage *h*, so as to cause it to expel the water from the buckets *i* on one side of wheel I.

The height of the water in said compartment J is indicated by an external glass gage, K, which communicates at its top and bottom with the same. The surplus steam escapes from said water-compartment J, through a bent pipe, L, to the main smoke-flue M of the apparatus. Said pipe L is carried through tank E, so as to warm the water in the latter before it is supplied to the boiler. As the water enters one of the lower spaces C it will not condense the steam formed in the boiler proper F.

N designates a shorter supplemental smoke-flue, attached to the outside of flue M, and communicating therewith near its upper end through opening *m*. Said flue N connects with furnace B by means of horizontal flue or passage O. P designates a similar horizontal passage arranged above passage O, and making communication between furnace B and main flue M. G designates a bent or inverted V-shaped passage, already referred to, connecting said passage P with said flue M, and G′ designates a similar passage arranged under G, and making the same connection.

Q designates a damper or cut-off, extending across casing A at the entrance of passages O and P to the furnace B, and may be turned so as to close either one of said passages. When passage P is closed, the products of combustion pass out through lower passage O without reaching V-shaped passages G G′, and the minimum degree of heat will be applied to boiler-space F. When passage O is closed, a considerable part of the hot air and products of combustion will pass from the furnace through passages G G′, and a greater degree of heat will be applied to said chamber F. As shown in Fig. 1, the said damper or cut-off may be arranged so as to let the hot air and products of combustion pass partly through O and partly through P, thereby increasing the draft. Said damper is operated by an arm, R, on the outside of its casing.

S designates a detachable shaft for said wheel I, which may be held to said casing A by means of collars or cross-pins, or in any

convenient manner. It is not an indispensable feature of my invention.

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

1. In a rotary engine, the wheel I, water-compartment J, and guide-casings H, slotted at *h*, combined with the furnace B, provided with double walls, and V-shaped flues G G′, substantially as described, and for the purpose set forth.

2. In a rotary engine, the combination of furnace B, with connected flues M N, bottom passages O P, V-shaped or bent passages G G′, and damper or cut-off Q, substantially as and for the purpose set forth.

In testimony that I claim the above I have hereunto subscribed my name in the presence of two witnesses.

THOMAS F. SPARROW.

Witnesses:

W. S. COUCHMEND,

HARRY Y. ANDERSON.