(No Model.)

J. J. BLAIR.

REVOLVING CYLINDER ENGINE.

No. 305,565. Patented Sept. 23, 1884.

Fig. 1.

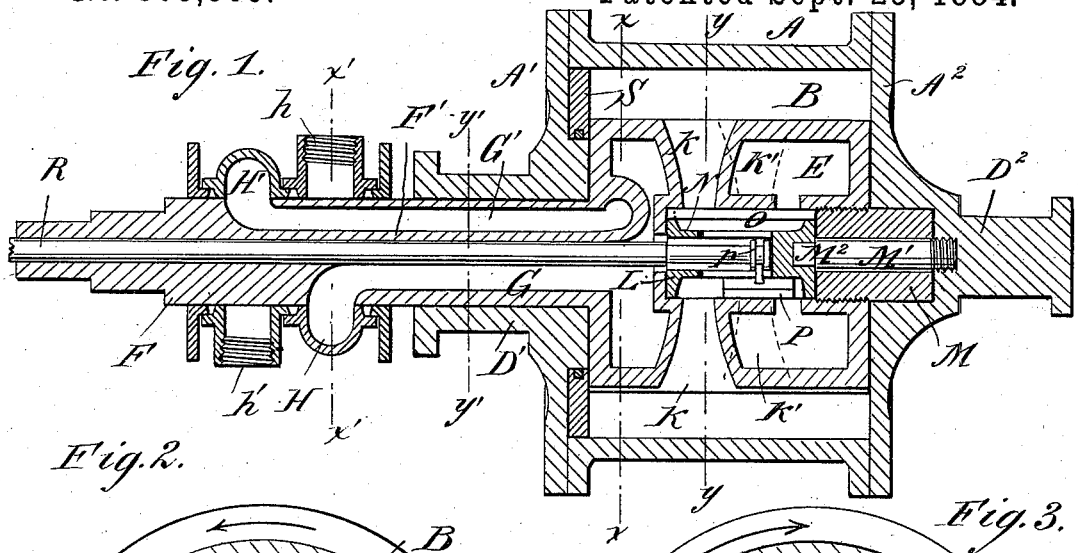


Fig. 2.

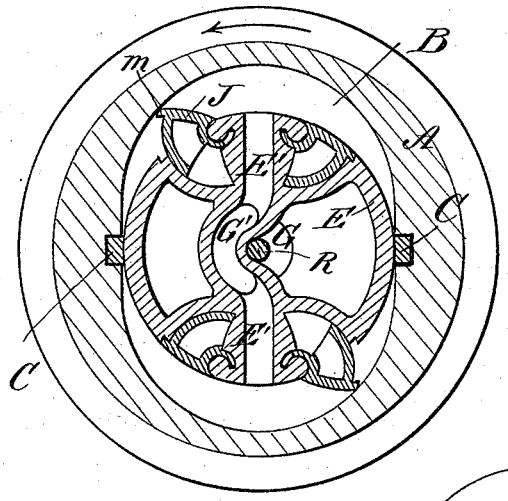


Fig. 3.

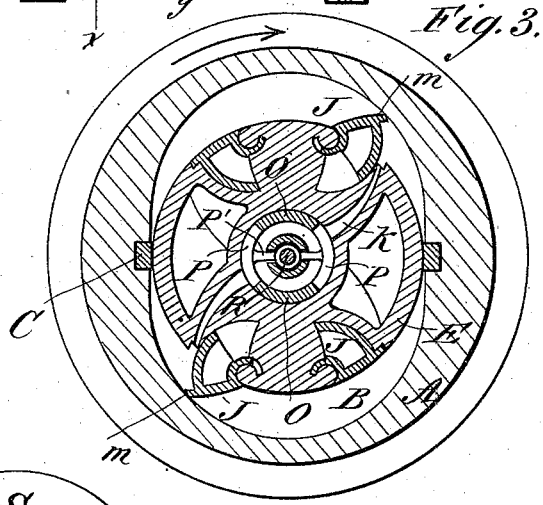
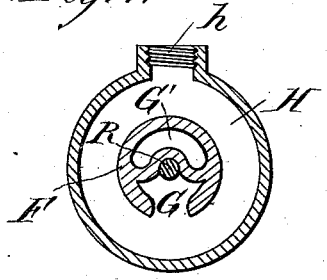


Fig. 4.



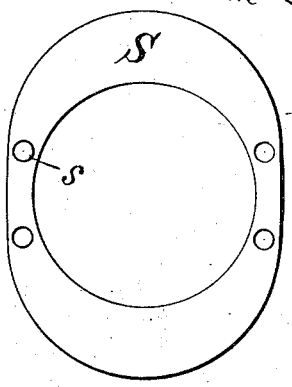
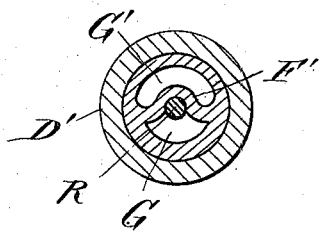


Fig. 6.

Fig. 5.



WITNESSES:

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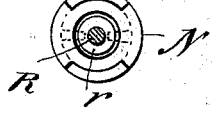
C. Sedgwick

Fig. 7.

Fig. 8.



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UNITED STATES PATENT OFFICE.

JOHN J. BLAIR, OF TACOMA, WASHINGTON TERRITORY.

REVOLVING-CYLINDER ENGINE.

SPECIFICATION forming part of Letters Patent No. 305,565, dated September 23, 1884.

Application filed March 14, 1884. (No model.)

To all whom it may concern:

Be it known that I, JOHN J. BLAIR, of Tacoma, in the county of Pierce and Territory of Washington, have invented a new and Improved Revolving-Cylinder Engine, of which the following is a full, clear, and exact description.

The object of my invention is to provide a new and improved revolving-cylinder engine in which the piston remains stationary and the cylinder revolves.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a longitudinal sectional elevation of my improved revolving-cylinder engine. Fig. 2 is a cross-sectional elevation of the same on the line *x x*, Fig. 1. Fig. 3 is a cross-sectional elevation of the same on the line *y y*, Fig. 1. Fig. 4 is a cross-sectional elevation of the same on the line *x' x'*, Fig. 1. Fig. 5 is a cross-sectional elevation of the same on the line *y' y'*, Fig. 1. Fig. 6 is a face view of the packing-plate of the cylinder. Fig. 7 is a perspective view of the reversing-valve. Fig. 8 is a cross-sectional elevation showing the valves.

The cylinder A is made cylindrical on the outside, and the opening B in the same is of the form of two semi-cylinders elongated at the diameter edges beyond the center of the circle, and on each side of the opening a packing-strip, C, is held.

To the cylinder A the heads A' and A^2 are fastened, of which the former is provided with a tubular pivot, D', and the latter with a pivot, D^2, both of which pivots are suitably journaled in proper bearings. The cylinder A contains the hollow cylindrical piston E, from one end of which the shaft F projects through the tubular pivot D', which shaft is provided with a transverse partition, F', dividing it into the steam-entrance channel G and the exhaust-channel G'.

On the shaft F the hollow collars H and H' are held, which are in communication with the steam-inlet and steam-exhaust pipes, the said collars being provided with the necks *h* and *h'* for coupling the steam inlet and steam exhaust pipes. One of the said collars is shown in Fig. 4. The fixed piston E, which is made cylindrical and hollow, is provided with a transverse exhaust-channel, E', which leads to the exhaust-pipe G'. The piston is provided with four swinging gates, J, which swing outward from the piston, and their outer edges rest on the inner surface of the opening B in the cylinder, the gates being moved outward by the steam-pressure, and being moved inward by the pressure on them of the surface of the opening in the cylinder. I have provided four gates, J, two for running in one direction and two for running in the opposite direction. Each pair of gates is provided with the steam-channels K or K', which conduct the steam from the middle of the piston to the steam-space between the outer surface of the piston and the inner surface of the cylinder, the outer ends of the said channels being formed under the tongues or lips *m*, formed on the outer or swinging edges of the gates J, so that when the steam is admitted into the channel the pressure of the steam first swings the gates J outward. In the middle of the piston a cylindrical valve-chamber, L, is arranged, in the end of which a cylindrical journal-block, M, is screwed, which is mounted loosely on a valve-stem, M', having one end screwed into the cylinder head A^2, and the other end, M^2, squared. The squared end M^2 projects into an aperture in the end of a cylindrical valve-carrier, N, held in the valve-chamber L, which valve-carrier carries the two opposite valves O. As the valve-stem M' revolves with the cylinder-head A^2, the valve-carrier N, into which the squared end of the valve-stem M' projects, will also be revolved with the valve-chamber L. Between the adjoining edges of the valves O similar valves, P, are held, which are about half the length of the valves O. The valves P are each provided on their inner surfaces with a stud, P', which stud projects into an annular groove, *r*, formed on the inner end of the rod R, extending longitudinally through the shaft F and through the middle of the valve-carrier N, which rod R is adapted to be moved in the direction of its length, and is provided for the purpose of operating the reversing-gear of the engine.

In the inner surface of the head A' a packing-plate, S, is located, which is acted upon by steam admitted to the space between the said packing-plate and the inner surface of

the head A′, through apertures *s*, whereby the said packing-strip can be pressed against the end surfaces of the gates and thus form a tight joint.

The operation is as follows: The piston remains stationary and the cylinder revolves, as shown by the arrow in Figs. 2 and 3. The steam acts on the sides of the opening of the cylinder in both halves of the same, so that each gate J of the pair in use is opened twice for each revolution. The steam passes through the hollow collar H, the steam-channel G, into the hollow piston, and then passes through the channel K or K′, throws open the gates, reacts against the gates, and thus revolves the cylinder. The piston is stationary, but its valves O revolve with the valve-carrier, and thus alternately open and close the channels K or K′—that is, the channels are open as long as steam is to be admitted, and are closed as soon as or before the gates are pressed back against the piston. The steam is admitted into the meniscus-shaped steam-spaces between the inner surface of the cylinder-opening and the outer surface of the piston only during one quarter of a revolution, and for the other quarter of the revolution the steam works under expansion. As the steam acts on the cylinder twice in every revolution, and as the steam is cut off after half the stroke, one quarter of the revolution must be made under expansion. As shown in Figs. 2 and 3, the gates swing in opposite directions—that is, if one pair of gates is open the cylinder will revolve in one direction, and if the opposite pair is open the cylinder will revolve in the opposite direction. As the valves P are arranged to slide, they can be adjusted to close the inner ends of either the channels or ports K or the channels or ports K′ by moving the rod R in the direction of its length. The engine can thus be reversed very easily and readily by simply shifting the valve P by means of the rod R.

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

1. In a revolving-cylinder engine, the combination, with a fixed hollow cylindrical piston, of the swinging gates J, the revolving cylinder A, the revolving valves O, held within the cylindrical chamber in the piston, and of the sliding valves P, adapted to close either the channels or ports K or the channels or ports K′, substantially as herein shown and described.

2. In a revolving-cylinder engine, the combination, with a fixed cylindrical hollow piston, E, of the revolving cylinder A, the revolving valves O, held in a cylindrical chamber, L, in the piston, the sliding valves P, having projections P′, and the sliding rod R in the shaft of the piston and provided with an annular groove, R′, into which the projections P′ of the valves P pass, substantially as herein shown and described.

3. In a revolving-cylinder engine, the combination, with a fixed hollow cylindrical piston, E, of the revolving cylinder A, the revolving valves O, held in a cylindrical chamber, L, in the piston, the valve-carrier N, the cylindrical journal M, and the valve-stem M′, secured in one head of the cylinder and connected with the valve-carrier N in such a manner as to turn the same, substantially as herein shown and described.

4. In a revolving-cylinder engine, the combination, with the fixed piston E, having a cylindrical chamber, L, in its middle, of the cylinder A, the valve-carrier N, the valves O, the valve-stem M′, secured in the head A^2 of the cylinder, and the cylindrical journal-block M, mounted on a valve-stem, M′, having a squared end, M^2, projecting into a recess in the valve-carrier, substantially as herein shown and described.

5. In a revolving-cylinder engine, the combination, with the fixed piston E, provided with two pairs of gates, J, for running in opposite directions, of the revolving cylinder A, the shaft F, connected with the piston and provided with the steam-inlet channel G and the steam-outlet channel G′, and of the collars H H′, held on the shaft and connected with the steam inlet and exhaust pipes, substantially as herein shown and described.

6. The combination, with a revolving cylinder, the opening of which is formed of two semi-cylinders united at their base or diameter edges and elongated at the said edges beyond the middle of the circle, of a fixed hollow cylindrical piston provided with swinging gates, substantially as herein shown and described.

JOHN J. BLAIR.

Witnesses:
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W. H. HARRIS.