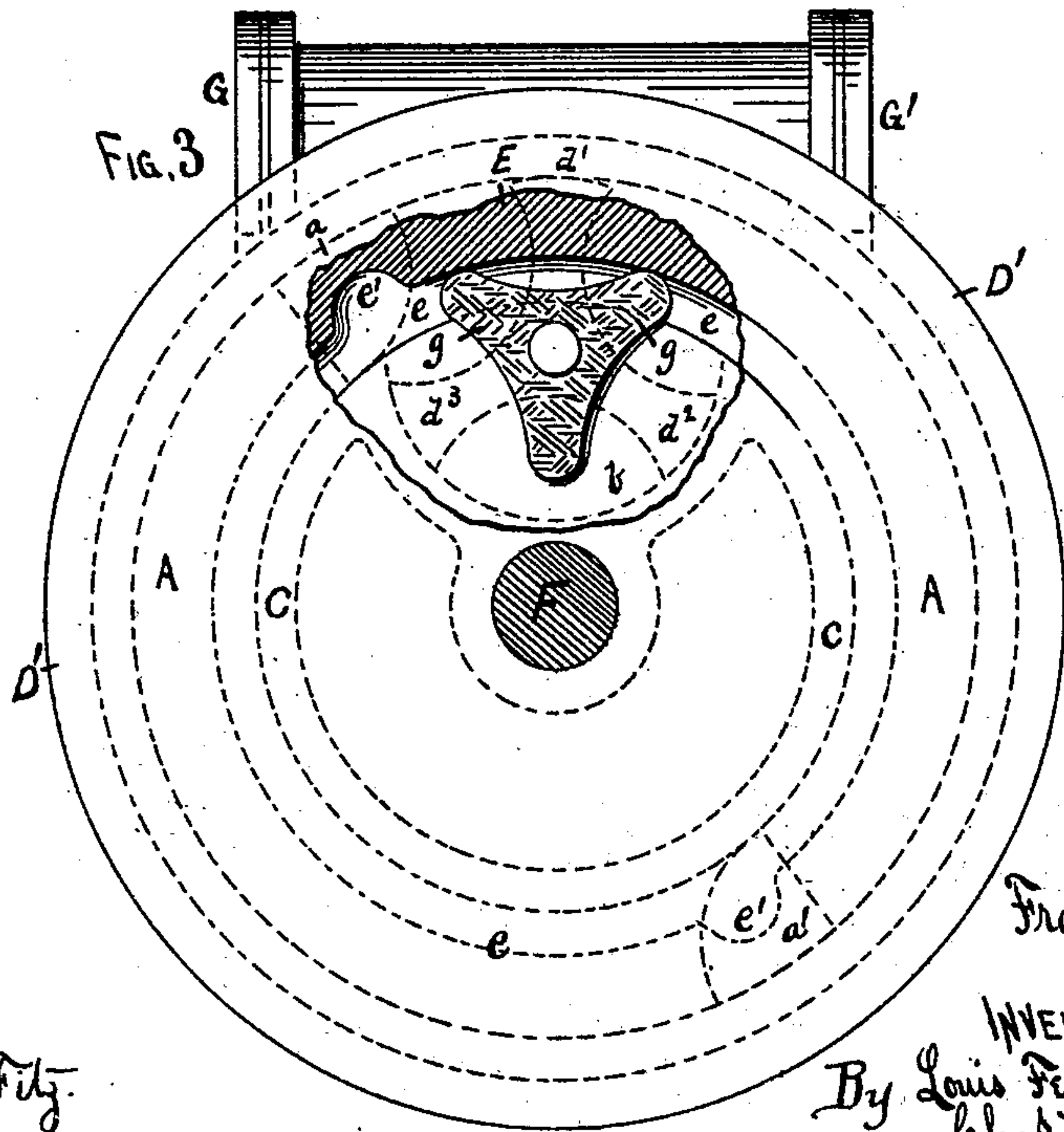
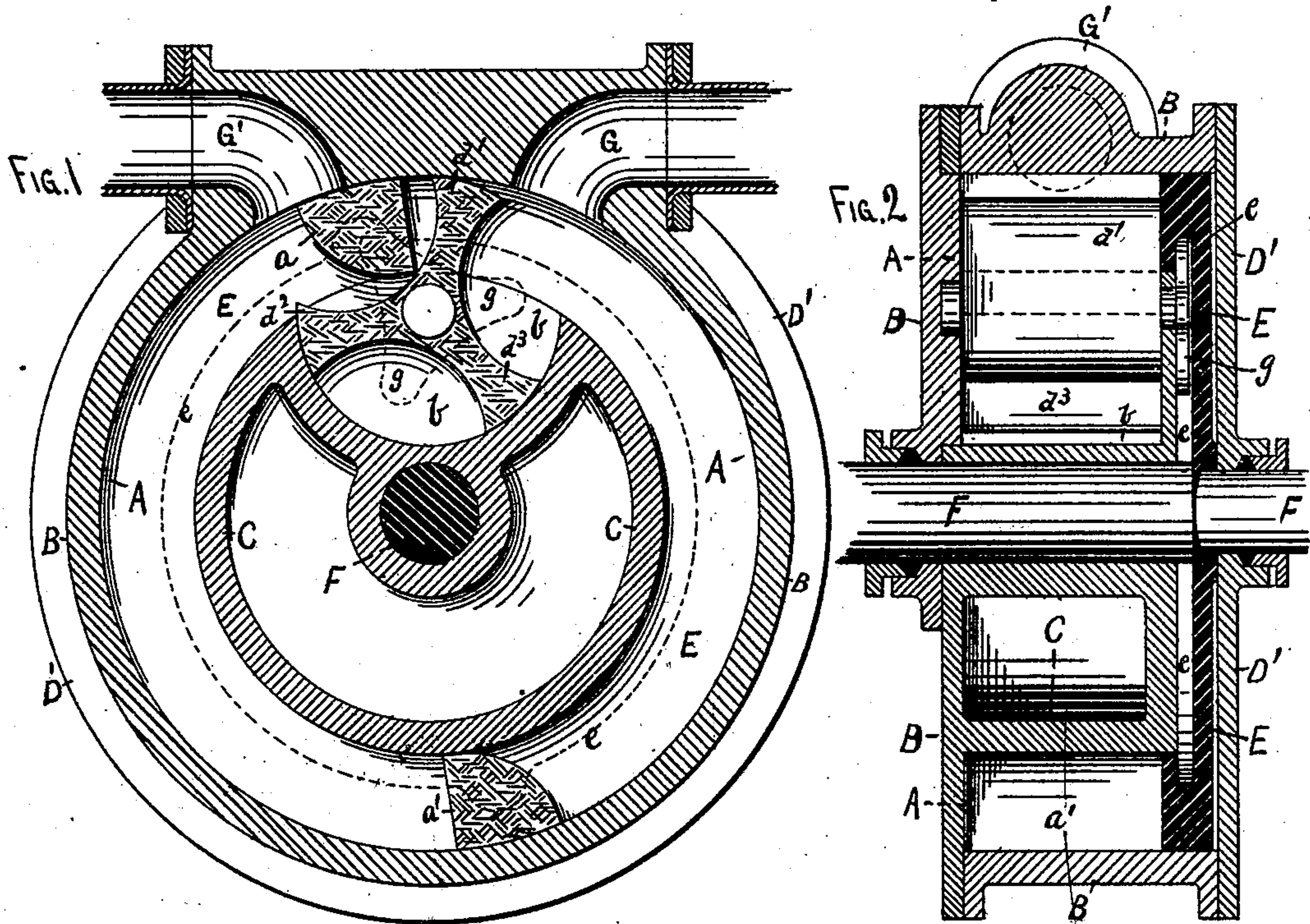


F. BERGQUEST.  
Rotary-Engine.

No. 226,829.

Patented April 27, 1880.



WITNESSES.  
J. Henry Fitz.  
J. R. O'Neill.

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# UNITED STATES PATENT OFFICE.

FRANK BERGQUEST, OF MINNEAPOLIS, MINNESOTA.

## ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 226,829, dated April 27, 1880.

Application filed January 22, 1880.

*To all whom it may concern:*

Be it known that I, FRANK BERGQUEST, of Minneapolis, in the county of Hennepin and State of Minnesota, have made certain new and useful Improvements in Rotary Engines, Pumps, &c., which improvements are fully set forth in the following specification and accompanying drawings, in which—

Figure 1 is a sectional front elevation. Fig. 2 is a sectional side elevation; and Fig. 3 is a rear elevation, with a portion of the case broken out to show the interior arrangement.

This invention relates to that class of rotary engines which may be used as engines, pumps, water-wheels, water-meters, &c.; and it consists in a revolving plate provided with two piston-heads running in an annular channel and adapted to act upon a three-way valve, which is alternately opened and closed to form an abutment, against which the steam reacts, as hereinafter set forth.

The invention further consists in a triangular cam secured to the rear end of the valve-stem and adapted to act, in conjunction with a notched groove in the revolving plate, to release the valve when the pistons strike it and hold it rigid at other times, as hereinafter set forth.

The outer casing or shell is so arranged that an annular channel or cylinder, A, is left between the outer rim, B, and the center partition or wall, C. This center C is secured to or forms part of the cover D, leaving a space between it and the back D', in which a circular plate, E, keyed to the shaft F, revolves, as shown in Fig. 2, its outer edge forming the bottom of the cylinder A, while the cover D forms its top. Secured to this plate E are two piston-heads,  $a a'$ , arranged to completely fill the cylinder A, and suitably packed to prevent steam passing around them.

$b$  is a semicircular cavity cut in the side of the center C, in which a three-way valve,  $d' d^2 d^3$ , is pivoted, each of its wings or arms being ground or packed to seat themselves against the sides of the cavity  $b$  and the outer side of the cylinder A, as shown, so that the steam cannot pass by them when closed. The cavity  $b$  is not cut entirely through the center C, sufficient metal being left at the bottom in which to step the valve  $d' d^2 d^3$ , (see Figs. 1 and 2,) this lower pivot or stem extending through the

metal thus left, and being provided with a triangular plate,  $g$ , so arranged that it will present one of its sides against the bottom of a groove,  $e$ , cut in the inside of the plate E, and thus hold the valve  $d' d^2 d^3$  rigidly, with one of its arms against the outer edge of the cylinder, to shut off the steam and prevent its passing backward around the cylinder. Beneath each piston-head  $a a'$ , however, the groove  $e$  is cut deeper than the ordinary surface, (see  $e'$ , Fig. 3 and dotted lines, Fig. 1,) so that at these points, where it is necessary for the valve  $d' d^2 d^3$  to be moved to allow the pistons  $a a'$  to pass by the valve, one corner of the triangular cam  $g$  will be forced into one of these notches  $e'$  when the piston strikes the arm of the valve, and thus permit it to revolve one-third of a revolution, which will bring the next arm of the valve into position. This action is more clearly shown in Fig. 3, which is a view of the rear of the engine, with a portion of the back D' and plate E broken out to show the arrangement of the triangular cam just after the piston has passed the valve. The steam and exhaust pipes are shown at G G'.

The operation is as follows: The steam being admitted at G fills the space between the valve  $d' d^2 d^3$  and first piston,  $a$ . The valve  $d$  being held by the cam  $g$ , the force of the steam will, of course, be expended upon the piston  $a$ , and the plate E revolved. This will cause the second piston,  $a'$ , and notch  $e'$  to act upon the valve  $d' d^2 d^3$ , as before described, and revolve it one-third of a revolution, and bring the second piston past the steam-port G, thus shutting off the steam and causing it to enter between the second piston,  $a'$ , and valve  $d' d^2 d^3$ . This action will continue to revolve the plate E until the first piston,  $a$ , has passed the exhaust-port G', when the steam which has been dead between the two pistons will escape. Then the first piston will act upon the valve and cam, as before described, and again come into action, and so on.

By this arrangement the engine may be made to run in either direction by simply reversing the order of the exhaust and steam pipes.

When used as a water-wheel the action will be the same, water being run through the pipe G instead of steam, and when used as a pump the power will be applied to the shaft and the

water drawn through one pipe and discharged from the other by the suction of the pistons *aa'*.

Two of the casings and revolving plates *E*, with one piston on each, and secured to one  
5 common shaft, with the pistons on opposite sides of the plates, so that the plates will be acted upon alternately, may be employed where it is desirable to avoid the dead steam between the pistons.

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

In a rotary engine, pump, &c., the revolving plate *E*, provided with one or more piston-heads, *aa'*, and notched groove *ee'*, in combination with 15 the valve *d' d<sup>2</sup> d<sup>3</sup>*, and triangular cam *g*, arranged and operating substantially as set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

FRANK BERGQUEST.

Witnesses:

C. N. WOODWARD,  
LOUIS FEESER.