

F. BÜRGER.
COAL-OIL MOTOR.

No. 170,813.

Patented Dec. 7, 1875.

Fig. 1.

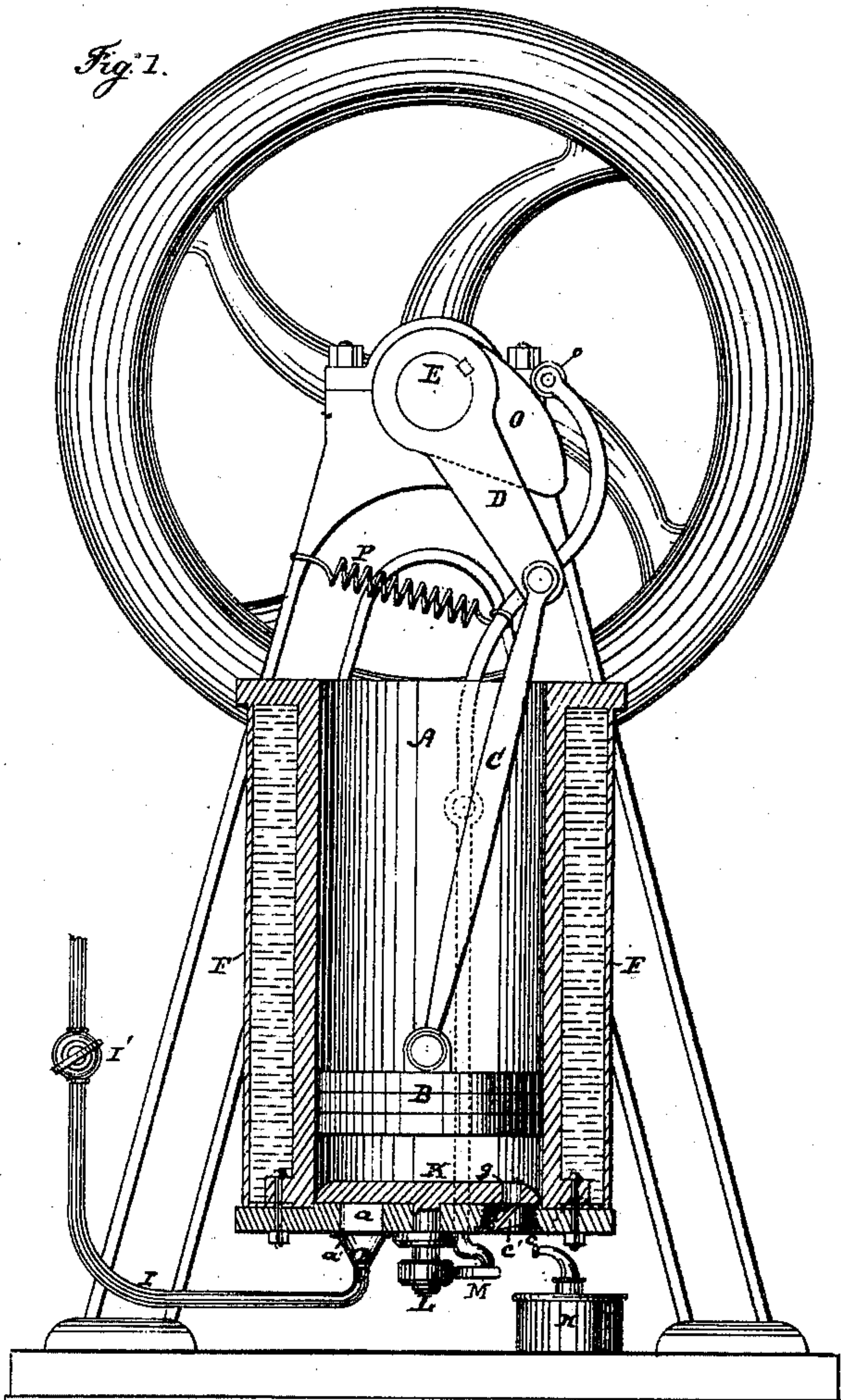


Fig. 2.

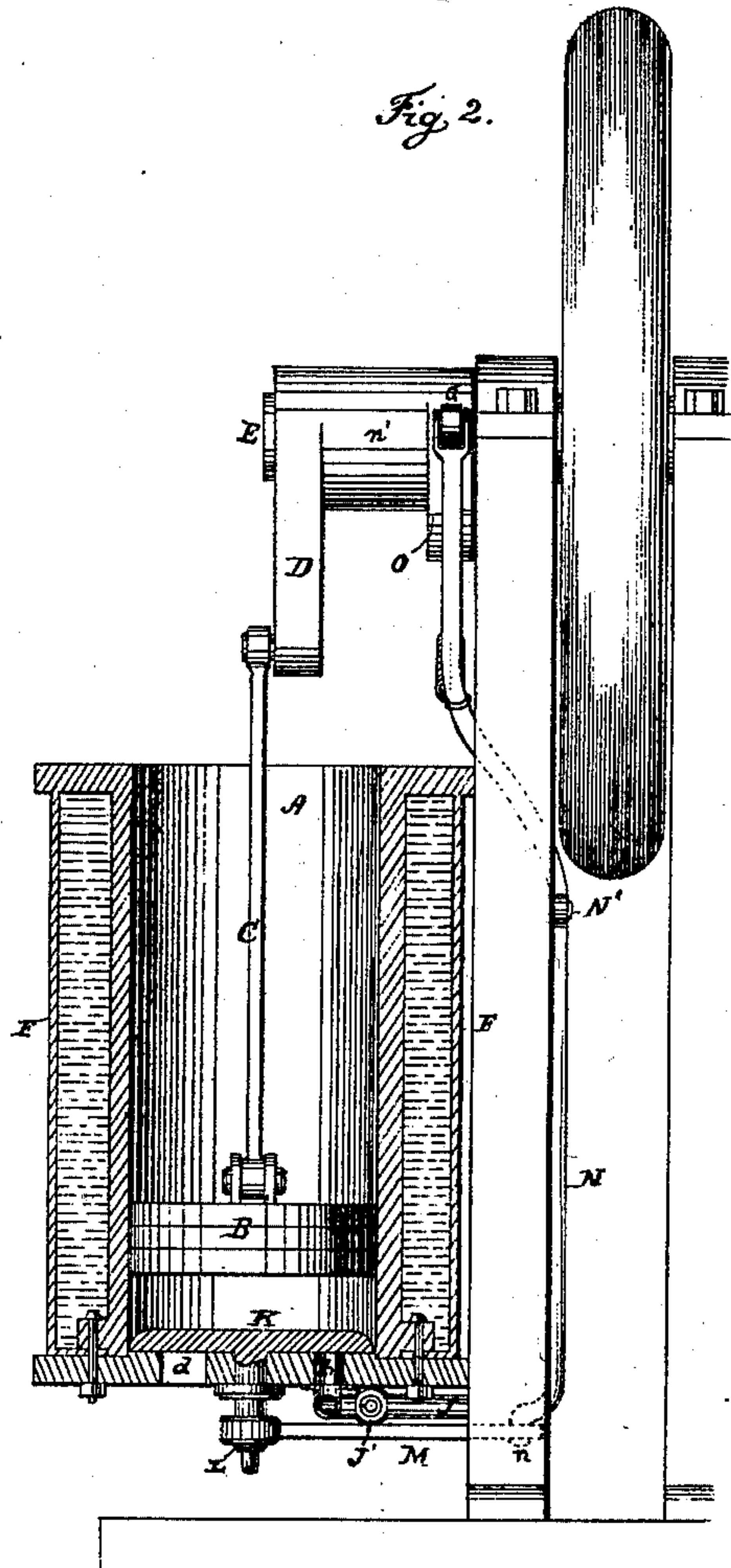
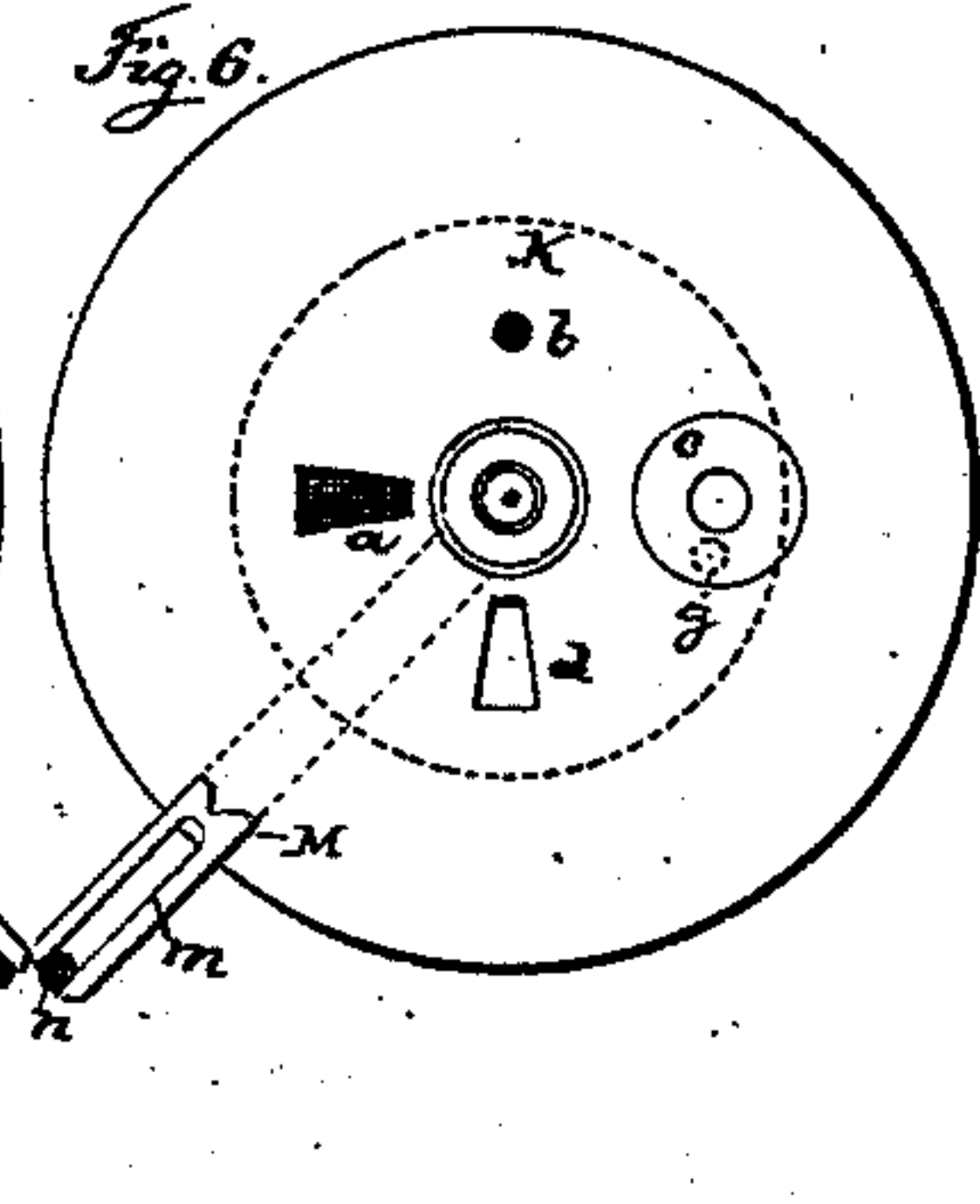
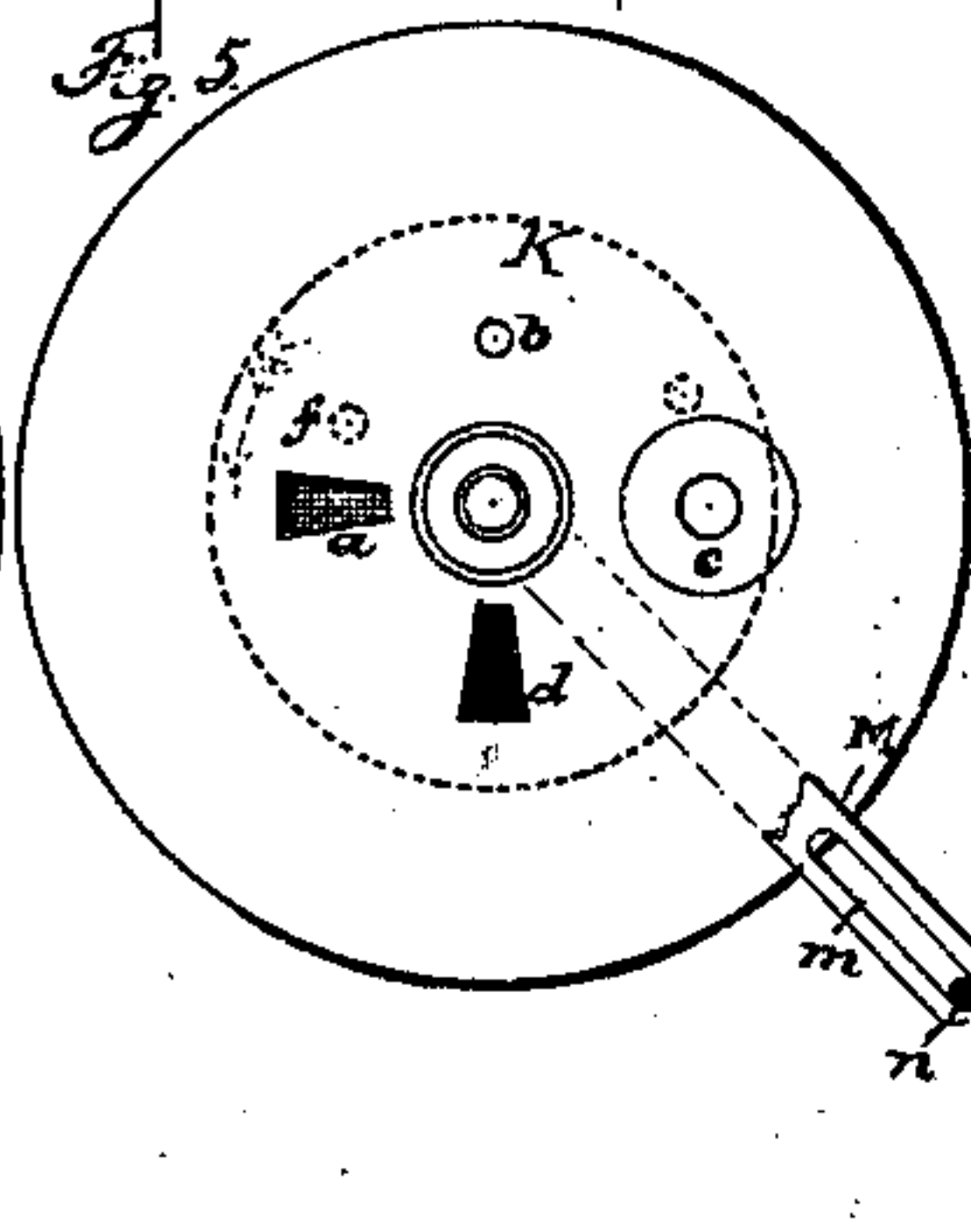
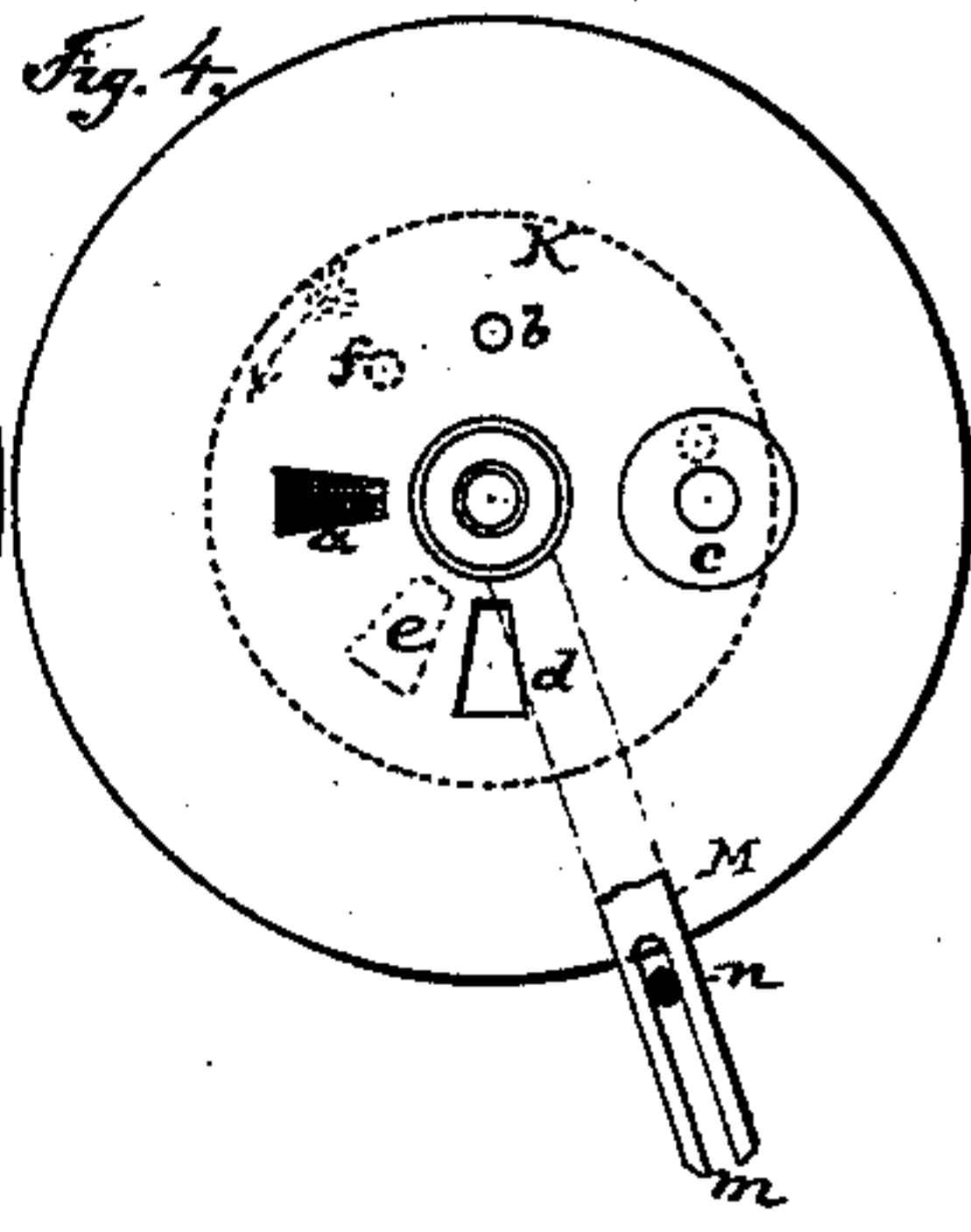
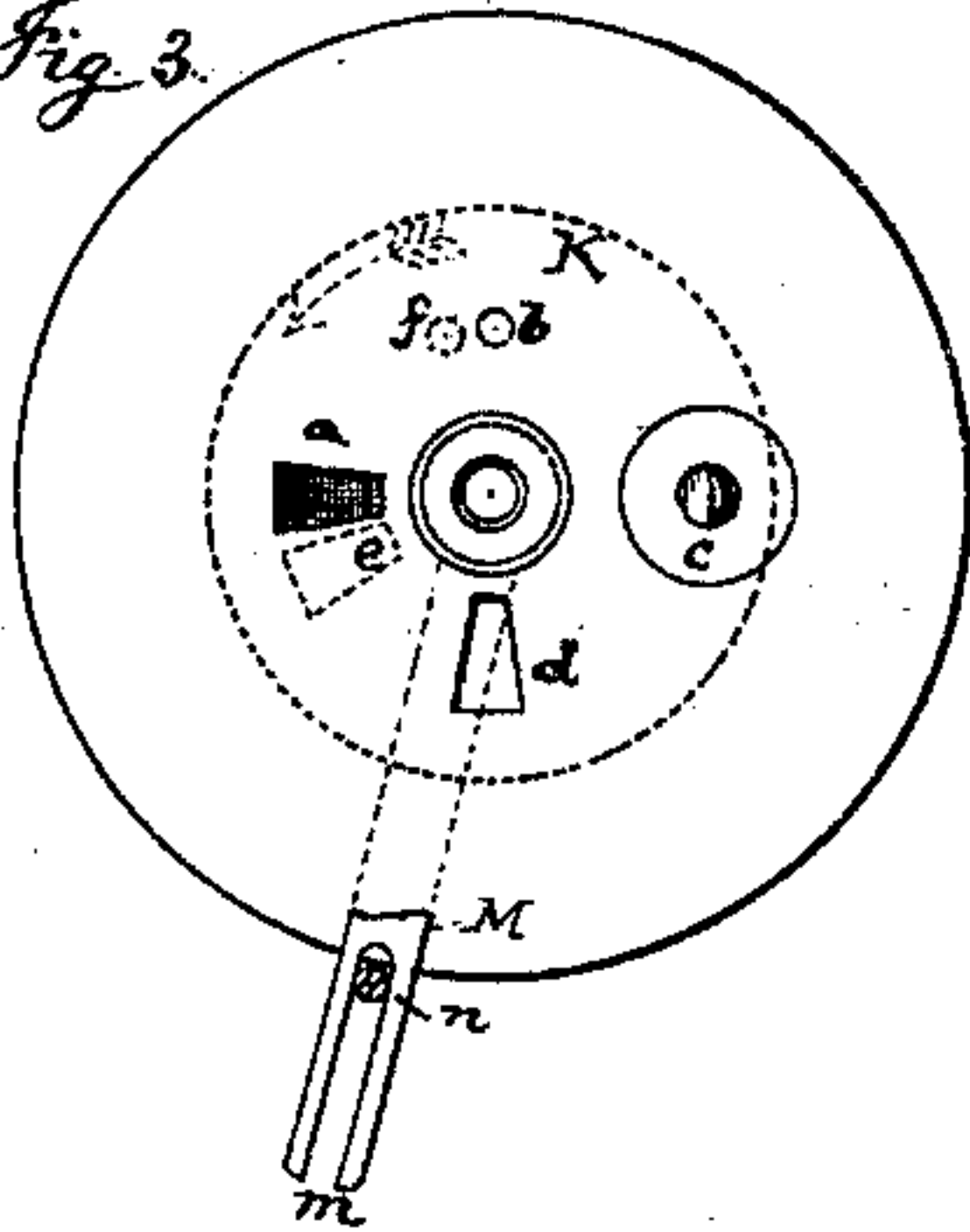


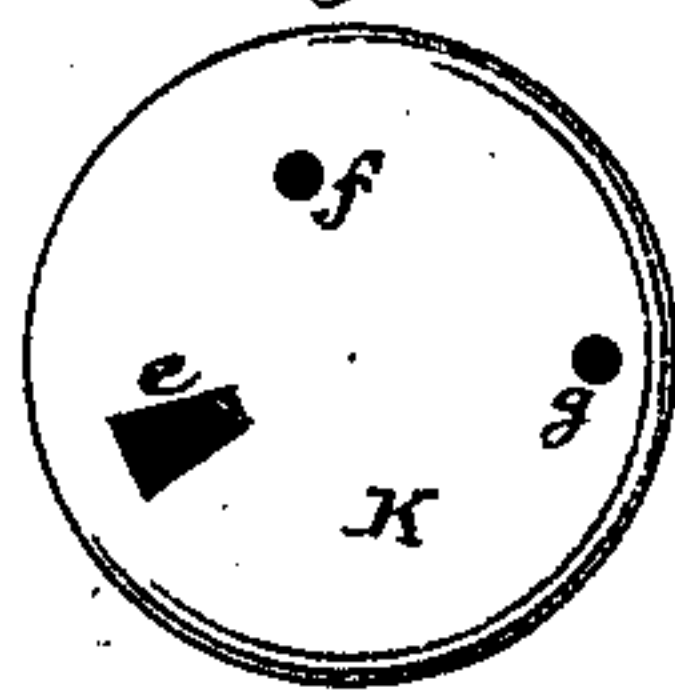
Fig. 3.



WITNESSES:

Herrn. Lauten
Herrn. K. Loh

Fig. 7.



INVENTOR:

Franz Bürger

UNITED STATES PATENT OFFICE.

FRANZ BÜRGER, OF WASHINGTON, D. C., ASSIGNOR OF ONE-HALF HIS RIGHT
TO SAMUEL N. HOYT, OF SAME PLACE.

IMPROVEMENT IN COAL-OIL MOTORS.

Specification forming part of Letters Patent No. **170,813**, dated December 7, 1875; application filed
November 16, 1875.

To all whom it may concern:

Be it known that I, FRANZ BÜRGER, of the city of Washington, in the District of Columbia, have invented a new and useful Improvement in Coal-Oil Motors, which improvement is fully set forth in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical central section of the cylinder, with a front view of the other parts, of my improved machine. Fig. 2 is a side view of my improved machine, with the said cylinder in section. Figs. 3, 4, 5, 6 are bottom views of the cylinder, representing the different positions of the oscillating valve-plate, by which the operation of my machine is governed. Fig. 7 is a top view of the valve-plate.

My invention relates to motors which are operated through the explosion of atmospheric air mixed with coal-oil, and through a vacuum formed by the cooling off of the gases resulting from the explosion; and it consists of a steam-cylinder surrounded by cold water, and provided at its bottom with inlets for coal-oil and atmospheric air, an exhaust-hole, and an opening with a light valve for the admission of a flame from a lamp outside of the cylinder, and an oscillating valve-plate with corresponding opening, which is operated by a cam on the crank-shaft of the machine and a lever-arm, and which, by its thereby effected oscillations, opens and closes the said openings in the bottom of the cylinder successively, and admits to or exhausts from the cylinder the material necessary for the operation of the machine, and also, by excluding the atmosphere from the cylinder at the return stroke of the piston, causes the formation of a vacuum in the cylinder.

In the drawings, A represents a cylinder made of metal, and open at the top; B, a piston, and C a connecting-rod, operating the crank D of a main shaft, E. The cylinder A is surrounded by another cylinder, F, and the space between is filled with a constant supply of cold water to keep the cylinder A cool. The bottom G of the cylinder A is provided with the openings *a b c d*. The opening *a* serves for the admission of coal-oil, the open-

ing *b* for the admission of atmospheric air, *c* for the admission of the flame of a lamp, H, and *d* for the exhaustion of the burnt gases. The coal-oil is conducted through a sieve, *a'*, in the opening *a*, whereby it is caused to enter the cylinder in the shape of fine spray, which mixes readily with the atmospheric air therein. A pipe, I, with a cock, I', for the regulation of the quantity of the supply, conducts the coal-oil from a reservoir to the opening *a*. Atmospheric air is conducted through a pipe, J, with a regulating-cock, J', to the opening *b*. The opening *c* is provided with a valve, *c'*, which opens upward, and is light enough to be lifted by the pressure of the atmosphere, when the air within the cylinder becomes rarefied by the upward movement of the piston. On the bottom of the cylinder A, and nicely fitted to it, is the oscillating valve-plate K, which, by means of the central pin L and the rocker-arm M, is connected with cam-lever N and the cam O on the main shaft E. The lower end *n* of the cam-lever N moves in the slot *m* of the rocker-arm M, and the upper end *n'* is provided with a roller, *o*, which is caused by the tension-spring P to bear on the surface of the cam O, and thereby receive its motion. The lever N is pivoted to the frame of the machine at a point, N'. The valve-plate K is provided with the openings *e f g*, for the purpose of admitting or exhausting the materials necessary for the operation of the machine. When the piston B arrives near its lowest level the position of the valve K is as seen in Fig. 5, with the opening *e* above the exhaust-hole *d* of the cylinder. The piston finishes its down-stroke while the exhaust remains open. As soon as the piston rises the exhaust is closed, and the holes *a* and *b* are opened by the movement of the valve K, as seen in Fig. 6. The upward movement of the piston B causes the atmospheric air and the coal-oil to rush into the cylinder A with great force, and to commingle very rapidly, forming thereby a well-known explosive compound, which, by another movement of the valve K, whereby the openings *a* and *b* are closed, and *c* opened, as seen in Figs. 1 and 3, and the flame of the lamp H is drawn into the cylinder through the suction created by the

rising piston B, is ignited and explodes, closing the valve *c'*, and driving the piston B up to its highest level. The valve K now closes the opening *c*, thereby closing all the openings at the bottom of the cylinder, as represented in Fig. 4. The explosion having spent its power, the gases resulting therefrom are now rapidly cooled off and condensed by being in contact with the cold surface of the cylinder A. The so-created rarefaction or vacuum causes the atmosphere to press the piston B down, after which the described operation is repeated.

I claim as my invention—

1. The combination, with the cylinder of a hydrocarbon motor, of an oil-spraying apparatus and an independent air-inlet, whereby oil and air are commingled within the cylinder, substantially as set forth.

2. The combination of the open-end cylinder, the piston working in the same, the oscillating valve in the bottom thereof, and pro-

vided with a screen-opening, and openings for the admission of air for the flame and exhaust, and the oil and air inlet pipes, all substantially as set forth.

3. The upward-opening valve *c'* in the opening C in the bottom of the cylinder, in combination with the air-inlet-pipe, the piston, the oscillating valve, and the lamp, all substantially as set forth.

4. The open-end cylinder, the water-jacket surrounding the same, the piston, the oscillating valve, with its openings *e f g*, the valve *c'*, air and oil inlet pipes I J, lamp H, in combination with the shaft E, arm D, piston-rod C, cam O, crank-arm lever N, and rocker-arm M, having slot *m*, all constructed and arranged substantially as set forth.

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Witnesses:

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