No. 736,151. PATENTED AUG. 11, 1903.

A. PRIMAT.

ROTARY EXPLOSIVE MOTOR.

APPLICATION FILED JAN. 23, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

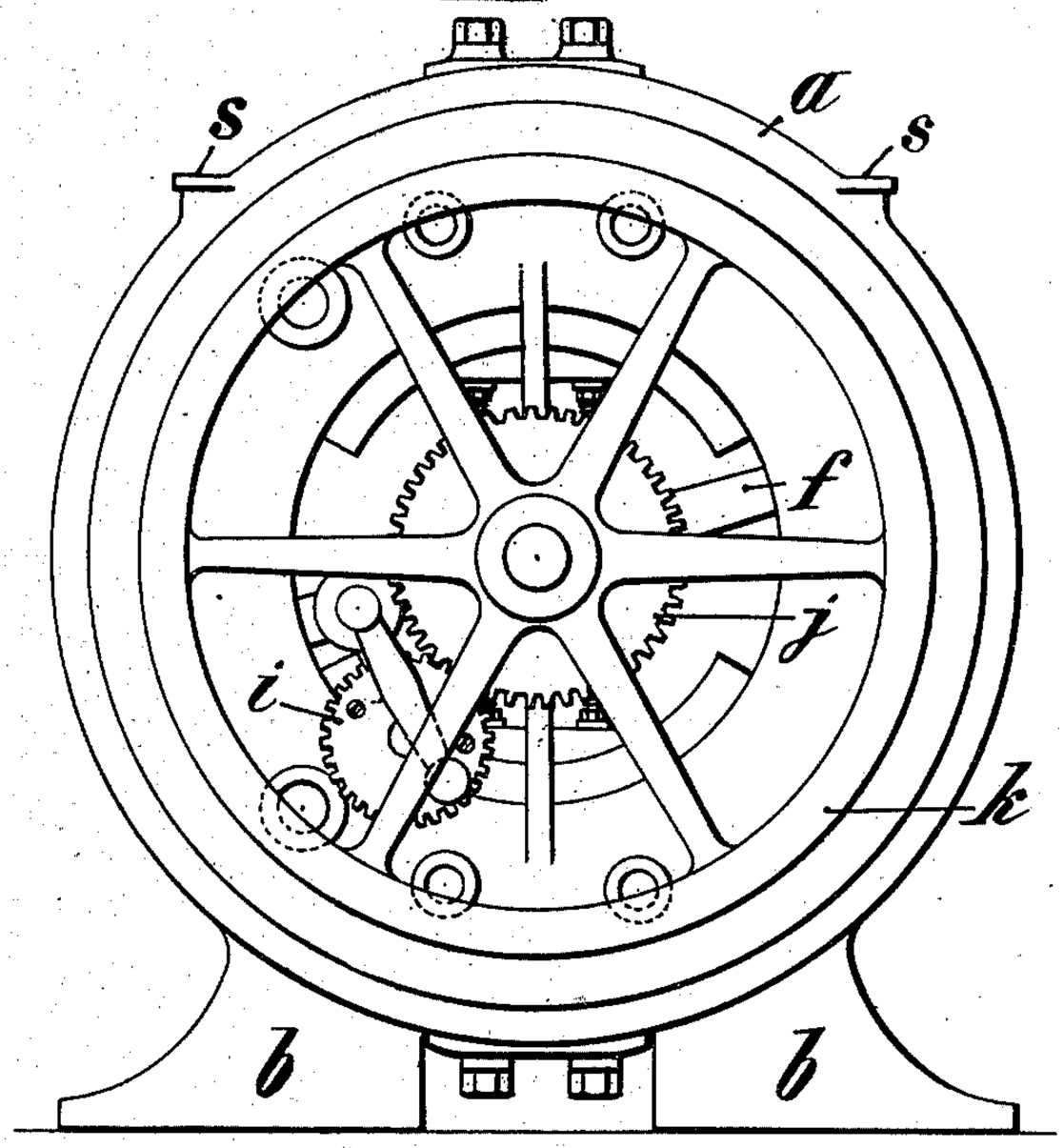
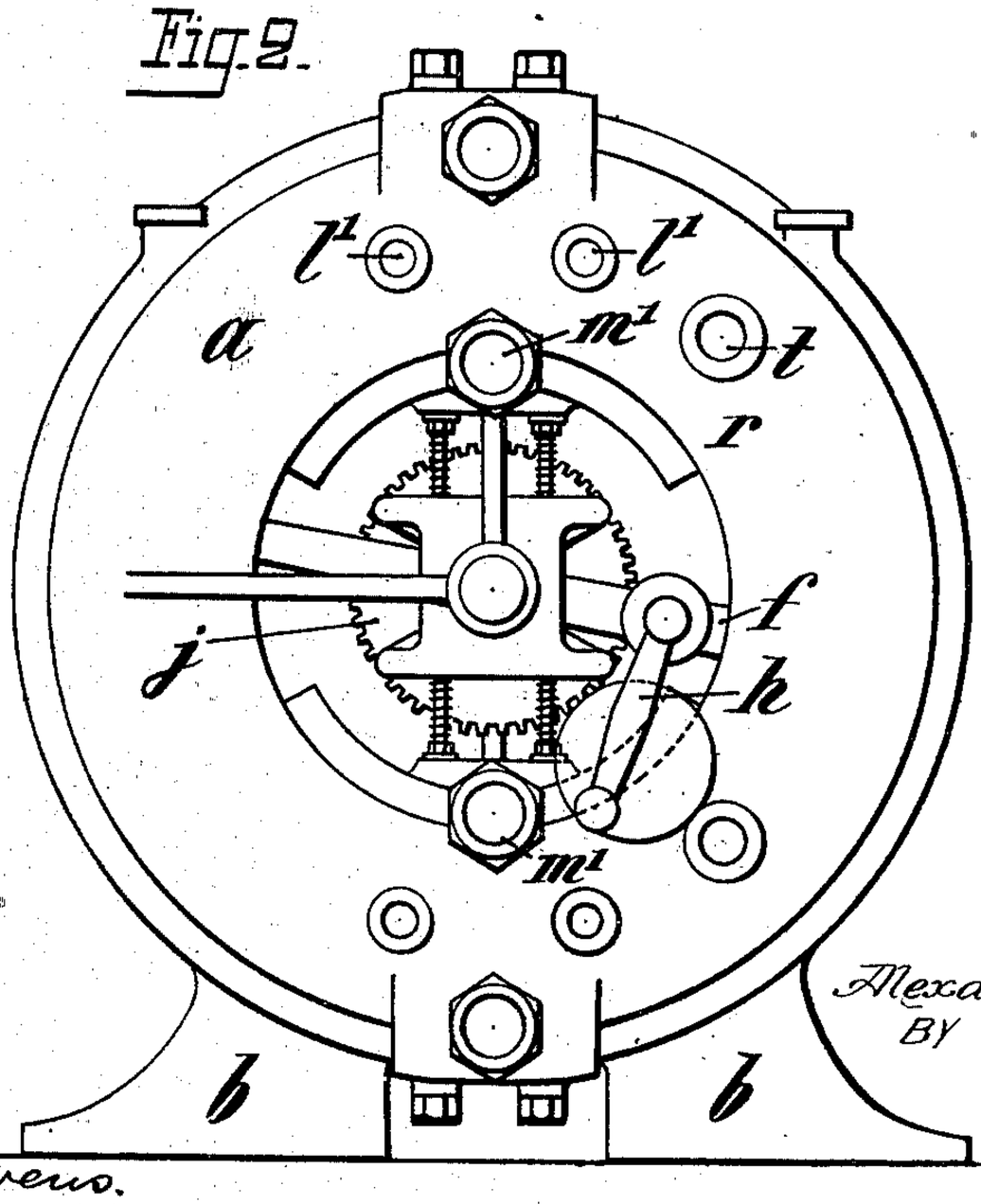


Fig. 2.



WITNESSES :

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NO MODEL. 2 SHEETS—SHEET 2.

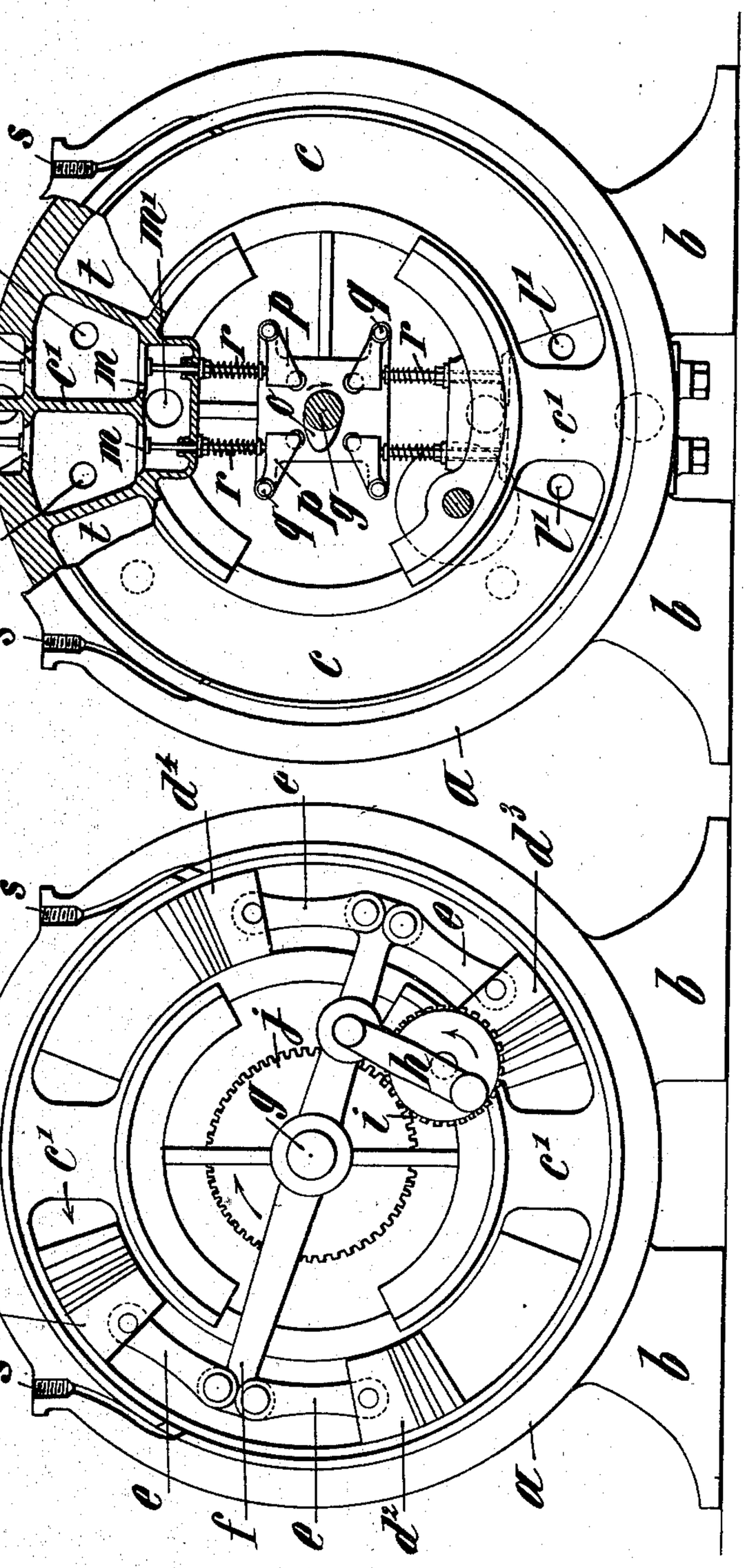

Fig. 4.

Fig. 3.

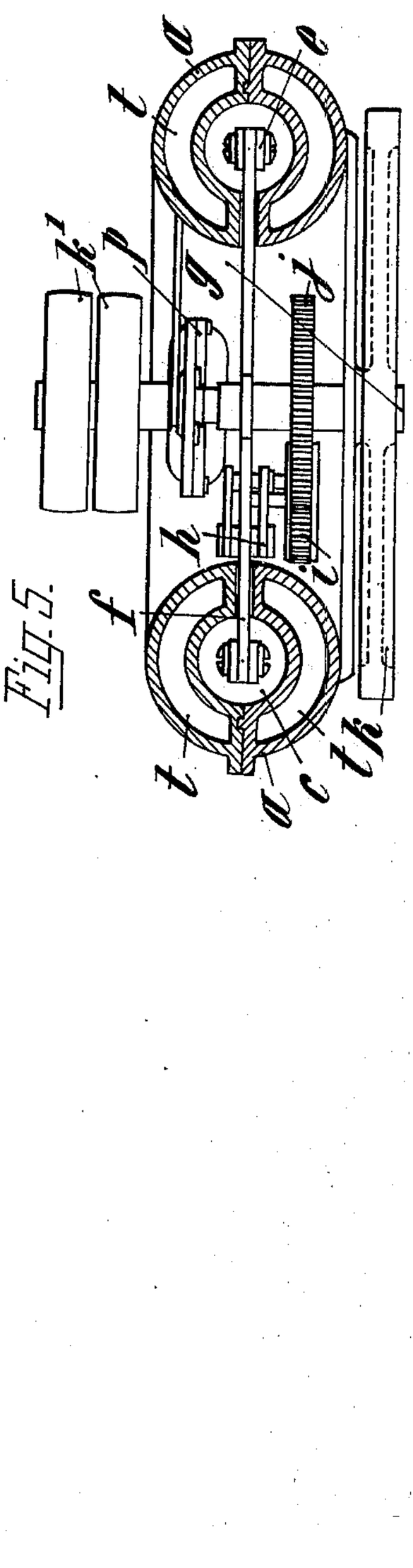

Fig. 5.

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No. 736,151. Patented August 11, 1903.

UNITED STATES PATENT OFFICE.

ALEXANDRE PRIMAT, OF PARIS, FRANCE.

ROTARY EXPLOSIVE-MOTOR.

SPECIFICATION forming part of Letters Patent No. 736,151, dated August 11, 1903.

Application filed January 23, 1903. Serial No. 140,245. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDRE PRIMAT, glover, of 38 Rue d'Hauteville, in the city of Paris, Republic of France, have invented Improvements Relating to Rotary Explosive-Motors, of which the following is a full, clear, and exact description.

This invention relates to a rotary motor of extremely small weight, the motive power of which may be either steam, petrol, alcohol, or illuminating-gas. The motor is characterized by a kind of ring or rim, divided by radiating partitions in such a manner as to constitute by their combination with the pistons a certain number of chambers or cylinders—four, for example.

When this motor is intended to operate with petrol, alcohol, or gas, it may be constructed as a motor working with a cylinder of four phases and provided with four pistons or for two phases with two pistons.

The shaft of this motor is driven directly without shocks, and there is no dead-center.

The invention will be readily understood by reference to the accompanying drawings, in which is illustrated, by way of example, a motor operating with a cycle of four phases and provided with four pistons and four cylinders.

In the drawings, Figure 1 shows the motor in front elevation. Fig. 2 is a front elevation upon the opposite side to that represented in Fig. 1. Fig. 3 is an internal view of the face corresponding to Fig. 1. Fig. 4 is an internal view of the face corresponding to Fig. 2. Fig. 5 is a horizontal axial section through the motor.

In the various figures similar letters of reference are employed to designate like parts.

As shown in Fig. 5, this rotary motor is constituted by two similar shells *a*, bolted one against the other. These shells also constitute a sort of rim, forming part of a frame *b*, of any suitable kind. Within this rim are situated chambers *c*, separated by partitions *c'*. The chambers *c* receive pistons *d' d²* and *d³* and *d⁴*, connected in pairs by means of links *e*. One pair of pistons is by the intermediary of the connecting-rods *e* rigidly connected with one extremity of the beam *f*, while the other pair is rigidly connected with the other extremity of the same beam, which is loosely mounted upon the central shaft *g*. The displacement of one pair of pistons in one direction and of the other pair in the same direction serves to displace the beam, which actuates a connecting-link *h*, articulated upon it. This connecting-link *h* is articulated at its other extremity upon a pinion *i*, forming a crank-disk, and imparts to this pinion a continuous circular movement. This movement is transmitted to a toothed wheel *j*, keyed upon the shaft *g*, thus furnishing the required reduction of speed. The shaft *g* is also provided with a fly-wheel *k* and pulleys *k'*. Each of the chambers *c* is divided into two by the pair of pistons, and each of these divisions is provided with admission-valves *l* and exhaust-valves *m*. The admission-valves *l* open naturally under the influence of the suction of the pistons to permit of the passage of the explosive mixture in order that it may reach the front of the pistons and explode under the action of the ignition device arranged in the orifices *l'*. The exhaust-valves *m* are opened by means of a cam *o*, keyed upon the shaft *g* in such a manner that the spent gases passing through the ports controlled by the valves *m* may escape through the orifices *m'*. The cam *o* with this object encounters small levers *p*, articulated at *q* and upon which rest the rods of the pistons, which are acted upon by springs *r*. In the example illustrated one of the pistons is always operative—that is to say, receives the force of the explosion—while the other piston diametrically opposite compresses the explosive mixture. Thus, for example, assuming the explosion to take place on the piston *d'*, Fig. 3, the piston *d⁴* will compress the explosive mixture during this time. The piston *d⁴* having compressed the mixture the explosion will take place and then the mixture previously sucked in by the piston *d³* will be compressed, and so in succession. In the meantime the spent gases will be discharged by the lift of the valves *m* under the action of the cam *o*. In a word, for each of the pistons taken separately there is, first, suction by forward displacement of the piston; second, compression of the mixture upon the return stroke of the piston; third, work upon forward displacement of the piston under the action of the explosion, and, fourth,

discharge upon the return stroke of the piston immediately before the admission of the fresh mixture.

The motor comprises lubricators *s* and a water-cooling jacket *t*.

The forms, details, accessories, materials, and dimensions of my novel rotary motor may obviously vary without thereby in any way affecting the principle of the invention.

I claim—

1. A rotary explosive-motor, comprising substantially a ring divided interiorly into duplicate chambers, each having an inlet and an exhaust for an explosive mixture, such inlet and exhaust each being controlled by a puppet-valve, a centrally-mounted shaft and a transverse beam carried thereby, duplicate pistons in each chamber connected to the beam, means for driving the shaft also connected with said beam, levers on which the rods of the exhaust-valves rest, and a cam on the shaft for actuating said levers.

2. A rotary explosive-motor, comprising a hollow ring divided into duplicate chambers, each having an inlet and an exhaust for an explosive mixture, a pair of pistons in each chamber, a centrally-mounted shaft, a beam thereon, links connecting the ends of the beam with each pair of pistons, a toothed crank-disk, a toothed wheel engaged thereby, and a link movably connecting said disk with said beam.

3. A motor, comprising two cylinders, pistons working therein, a walking-beam with its ends respectively in connection with said pistons, an engine-shaft, and a driving connection between the walking-beam and shaft, said connection comprising intermeshed gears, one being fastened to the engine-shaft and a link connected with the walking-beam and with the other gear.

4. An engine, comprising a walking-beam, two cylinder-cavities curved concentrically to the axis of movement of the walking-beam, two pistons in each of said cylinder-cavities and lying at opposite sides of the walking-beam and having connection therewith, and means for transmitting the movement of the walking-beam, said means comprising a link connected with the walking-beam, a gear with which the link has cranked connection and a second gear driven from the first-named gear.

5. An engine, comprising a walking-beam, two cylinder-cavities curved concentrically to the axis of movement of the walking-beam, two pistons in each of said cylinder-cavities and lying at opposite sides of the walking-beam and having connection therewith, means for transmitting the movement of the walking-beam, an engine-shaft axially coincident to the movement of the walking-beam and driven from said means for transmitting the movement of the walking-beam, a cam on the engine-shaft, and valves actuated by the cam.

The foregoing specification of my improvements relating to rotary motors signed by me this 6th day of January, 1903.

ALEXANDRE PRIMAT.

Witnesses:

AUGUSTUS E. INGRAM,

MAURICE H. PIGNET.