No. 719,653. PATENTED FEB. 3, 1903.

W. M. EVERETT.

ROTARY GAS ENGINE.

APPLICATION FILED JULY 28, 1899.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 2.

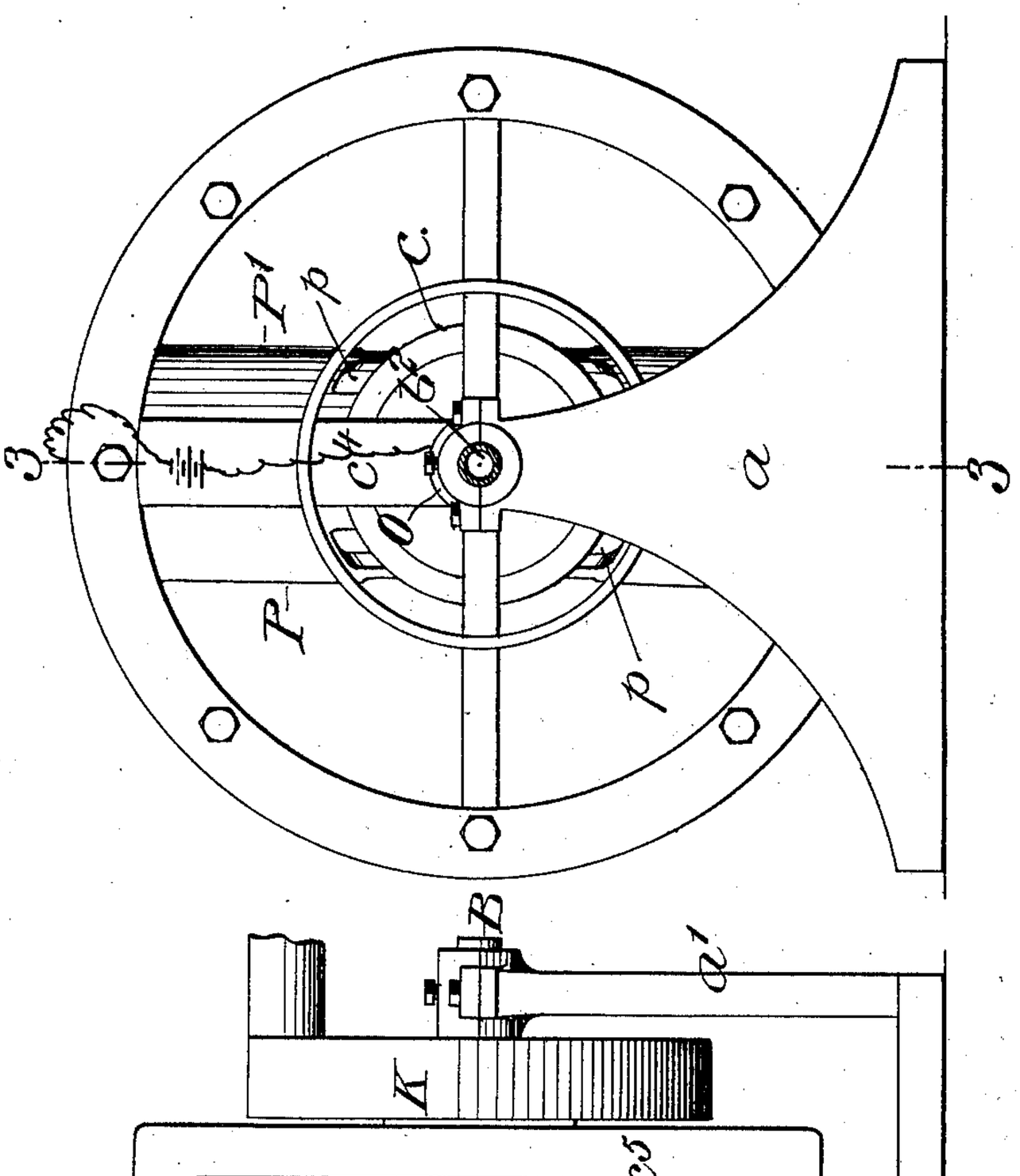
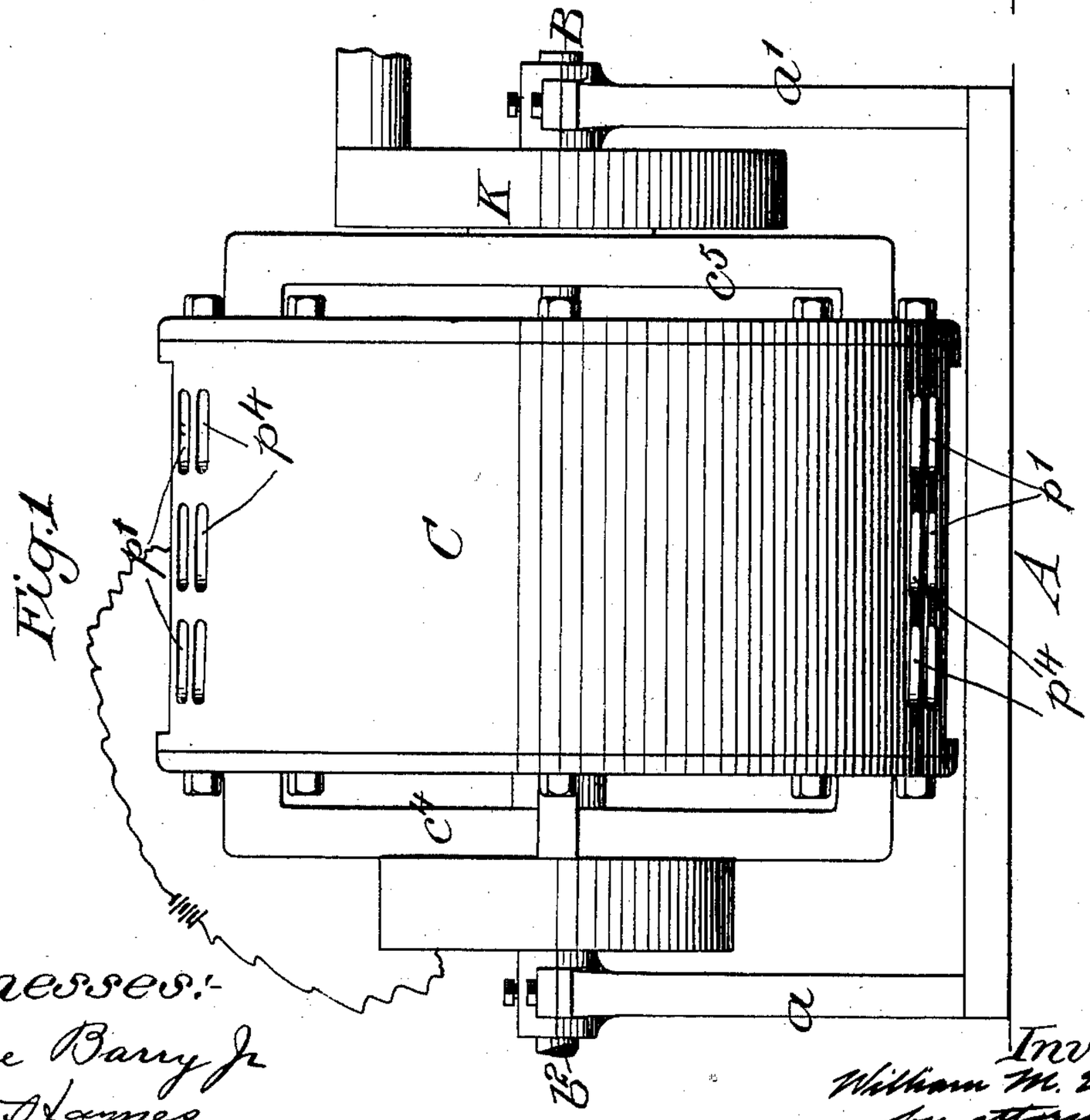


Fig. 1.



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NO MODEL. 3 SHEETS—SHEET 2.

Fig. 4.

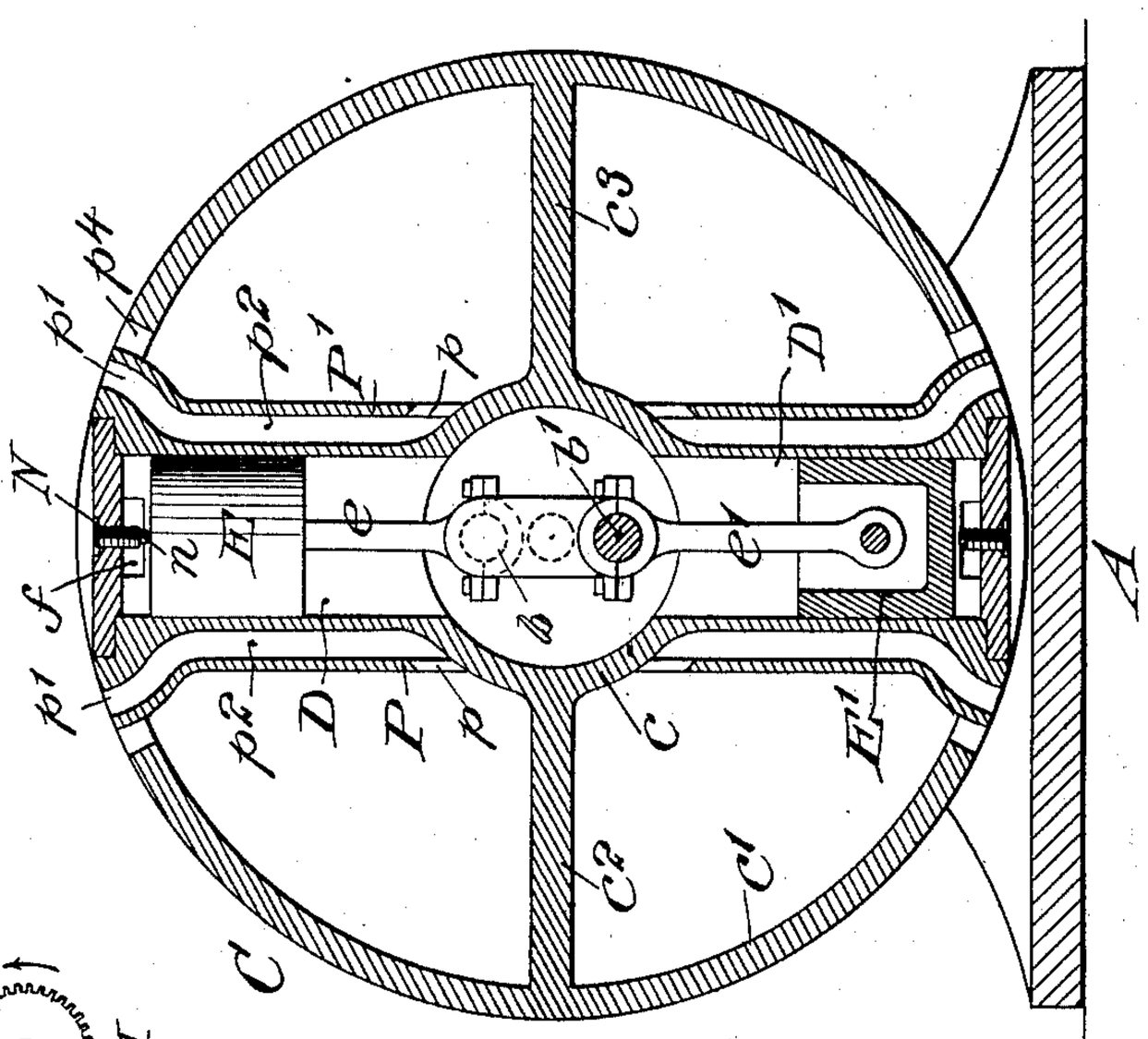


Fig. 5.

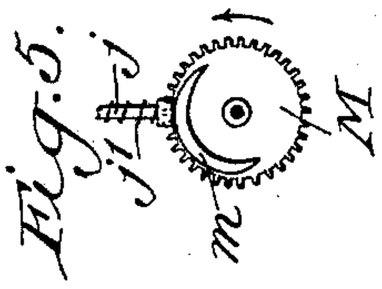
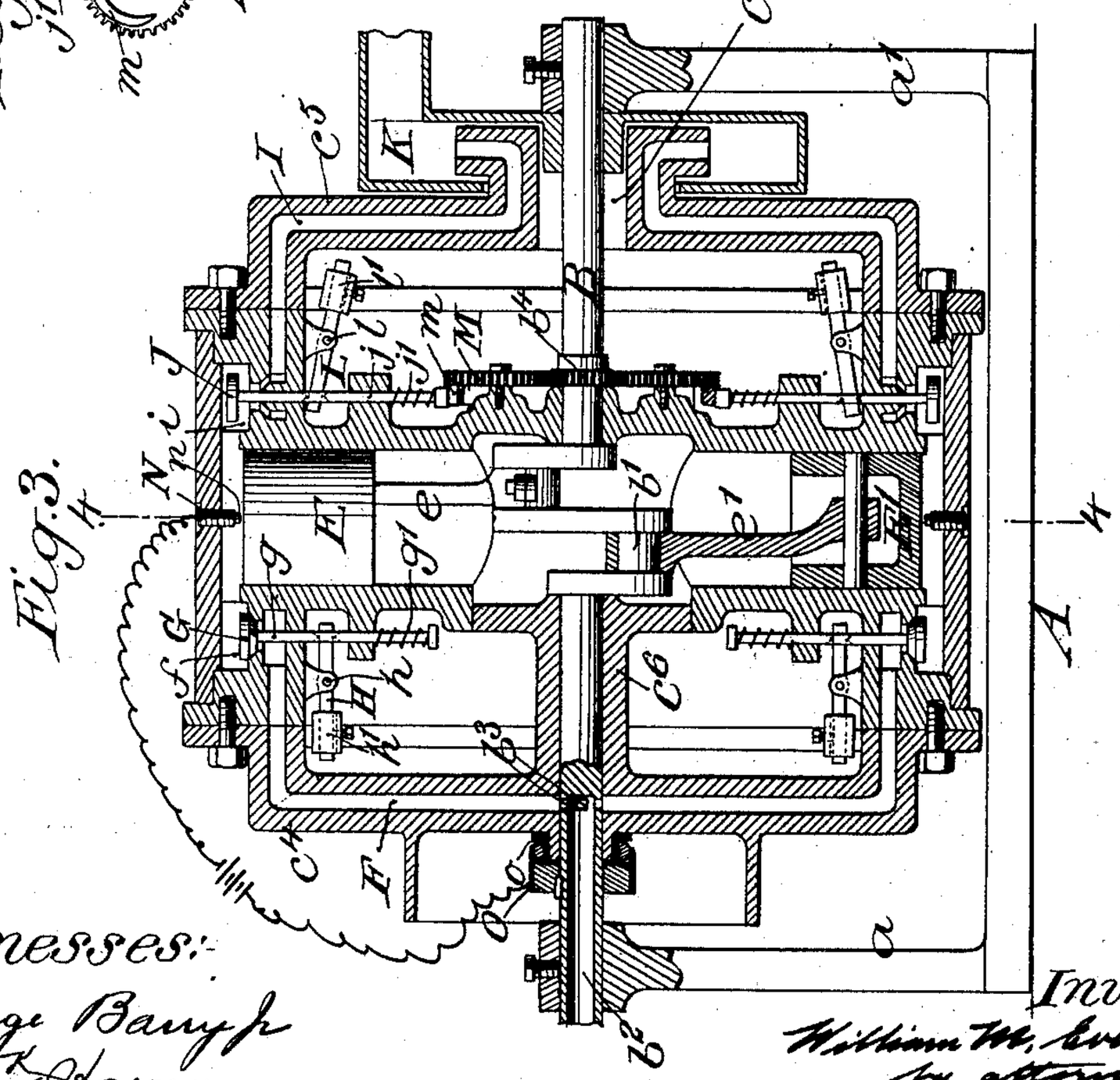


Fig. 3.



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No. 719,653. PATENTED FEB. 3, 1903.

W. M. EVERETT.

ROTARY GAS ENGINE.

APPLICATION FILED JULY 28, 1899.

NO MODEL. 3 SHEETS—SHEET 3.

Fig. 7.

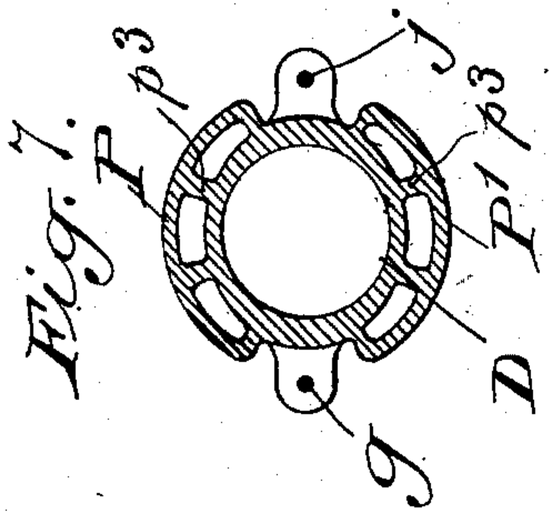
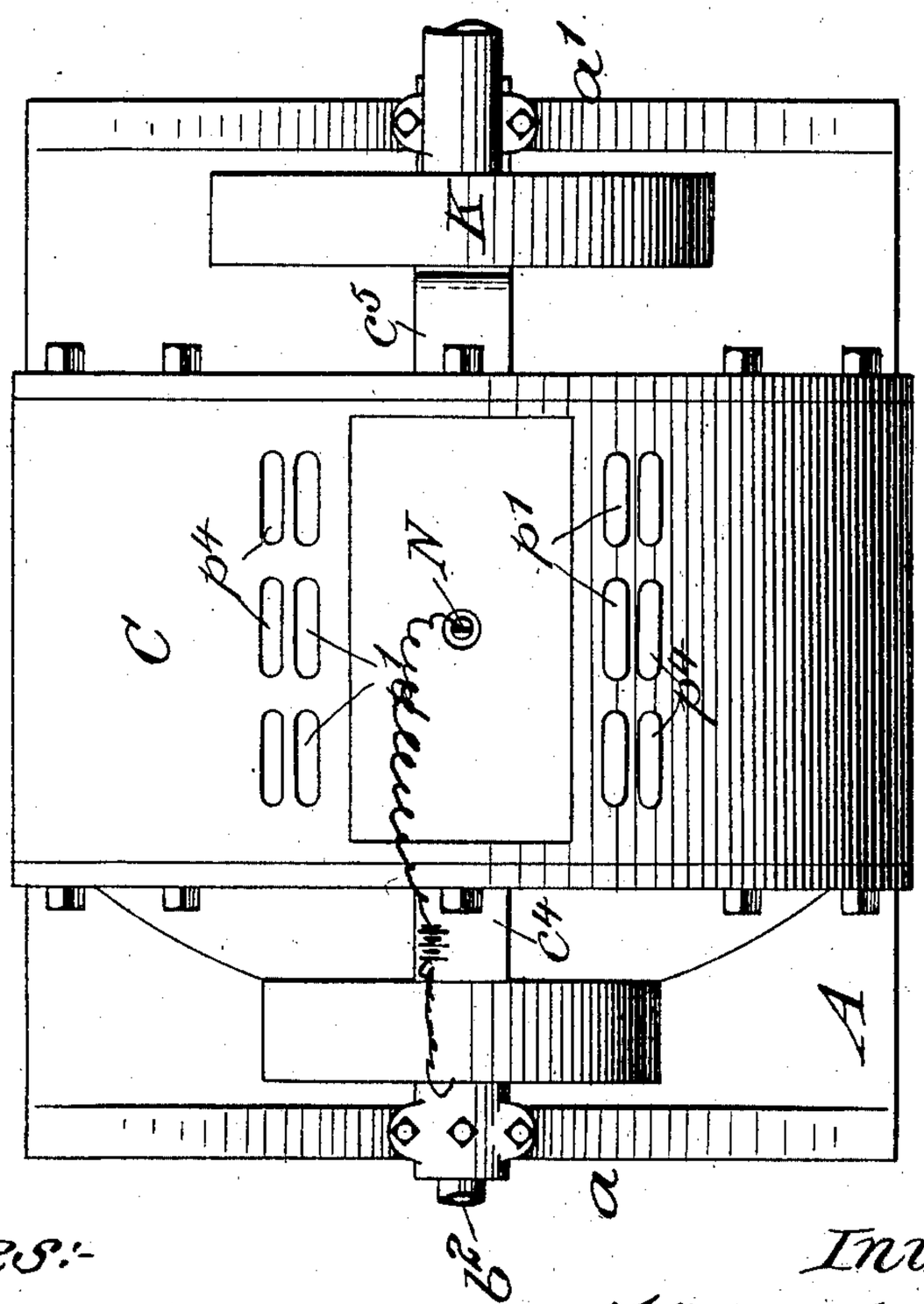


Fig. 6.



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UNITED STATES PATENT OFFICE.

WILLIAM M. EVERETT, OF TENAFLY, NEW JERSEY, ASSIGNOR OF ONE-FOURTH TO MANDEVILLE C. JACOBUS, OF ENGLEWOOD, NEW JERSEY.

ROTARY GAS-ENGINE.

SPECIFICATION forming part of Letters Patent No. 719,653, dated February 3, 1903.

Application filed July 28, 1899. Serial No. 725,353. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM M. EVERETT, a citizen of the United States, and a resident of Tenafly, in the county of Bergen and State of New Jersey, have invented new and useful Improvements in Rotary Gas-Engines, of which the following is a specification.

This invention relates to certain improvements in rotary gas-engines of the explosive type in which a plurality of cylinders are rigidly carried by a rotary frame, the said cylinders being arranged radial to the axis of rotation of the said frame, the piston-rods of the several cylinder-pistons being independently pivoted eccentric to the axis of rotation of the rotary frame.

The object of this invention is to provide certain improvements in the construction, arrangement, and operation of the several parts whereby the efficiency of the engine is materially increased, the structure at the same time being very simple and strong.

A practical embodiment of my invention is represented in the accompanying drawings, in which—

Figure 1 is a view of the engine in side elevation. Fig. 2 is a view of the engine in end elevation. Fig. 3 is a vertical longitudinal section in the plane of the line 3 3 of Fig. 2. Fig. 4 is a vertical transverse section in the plane of the line 4 4 of Fig. 3. Fig. 5 is a detail view showing the means for positively opening the exhaust-valve at predetermined intervals. Fig. 6 is a top plan view of the engine, and Fig. 7 is a transverse horizontal section through one of the cylinders.

The engine-base is denoted by A, and it is provided with a pair of supporting-uprights a a', within which is fixed a stationary shaft B. This shaft is provided about midway its ends with a double crank having pivot-pins b b' upon opposite sides of the said shaft. A hollow cylindrical frame C is mounted to rotate upon the stationary shaft B, which frame rigidly carries one or more pairs of cylinders D D', diametrically opposite each other. In the present instance I have shown one pair of these cylinders only carried by the rotary frame extending between the hub c of the frame and its periphery c'. To strengthen the frame, I provide a pair of diametrically opposite ribs c^2 c^3, which extend between the hub c and the periphery c' of the frame at points half-way between the cylinders D D'. The piston-heads, which are fitted to reciprocate within the cylinders, are denoted by E E', and to the said heads are hinged the outer ends of piston-rods e e', the inner ends of which are pivoted upon the eccentric pivot-pins b b' of the stationary shaft B. End arms c^4 c^5 extend diametrically across the opposite ends of the frame C, the arm c^4 having an inwardly-extended hub c^6, which embraces and is mounted to rotate upon the stationary shaft B. The arm c^5 is provided with a hub c^7, the bore of which is spaced from the shaft B. The stationary shaft B is formed tubular at one end, as shown at b^2, for the admission of gas from some suitable source of supply. (Not shown.)

As each of the cylinders E E' is provided with a similar set of gas inlet and exhaust ports and means for controlling the same, I will describe in detail one set only of the said devices. Openings b^3 lead from the interior of the tubular portion of the shaft into the inner end of a gas-inlet duct F in the end arm c^4, communication from the outer end of which duct is opened and closed to the interior of the cylinder-chamber through the gas-inlet port f by means of a valve G. This valve G is provided with an inwardly-extended stem g, and it is held with slight pressure against its seat by means of a spring g', engaging the said stem. The valve G is counterbalanced, so as to render it easily opened and closed when the engine is rotated at varying speeds by means of a weighted lever hinged at h to the frame C, which lever has one arm in engagement with the valve-stem g and its other arm provided with an adjustable weight h'.

A gas-exhaust duct I leads from a gas-exhaust port i through the arm c^5 into the interior of a stationary hood K, which surrounds the hub c^7, but is spaced therefrom. The exhaust end of the port I is led outwardly away from the axis of rotation of the frame in the hub c^7, so as to utilize the centrifugal action due to the rotary motion of the frame for accelerating the exhaust of the gas. Commu-

nication is opened and closed between the duct I and the exhaust-port *i* by means of a positively-operated valve J. This valve is provided with an inwardly-extended stem *j*, and it is held yieldingly closed under a slight tension by means of a coil-spring *j'*, which engages the said stem. This valve J is also counterbalanced, so as to render it easy to operate when the frame is rotated under varying speeds, by means of a counterbalance-lever L, hinged at *l* to the frame C, one arm of the lever being engaged with the stem *j* and the other arm provided with an adjustable weight *l'*. The valve J is positively opened at predetermined intervals, which in the present instance is once in every two revolutions of the frame, by means of a cam-gear M, pivoted on the frame adjacent to the shaft B, which gear meshes with a pinion b^4, fixed upon the stationary shaft B. The gear M is twice the size of the pinion b^4, so that it takes two revolutions of the frame to complete a single revolution of the gear. This gear M is provided with a cam *m*, which is fitted to engage the inner end of the valve-stem *j* and raise the valve away from its seat during a quarter-revolution of the gear.

The electrical ignition or sparking device may be of any well-known or approved form, that which I have shown herein comprising a screw-plug N, inserted from the exterior of the cylinder-head into the interior of the cylinder, which plug is provided with the usual sparking-points *n*, commutator-brush O, carried by the stationary shaft B, and a make-and-break device *o*, carried by the hub of the end arm c^4, which make-and-break device is electrically connected with the points *n*.

To keep the cylinder cool without the use of a circulation of water around the same, I provide wind-guards P P', extended partially around the exterior of the cylinder and spaced therefrom, which wind-guards have air-inlet openings *p* at their inner ends, leading from the interior of the cylindrical frame to the interior of the flues p^2, and air-outlet openings *p'*, leading from the outer ends of the said flues p^2 through the periphery of the frame. These flues are formed by ribs p^3, extending between the cylinder and the guards, which ribs serve to conduct some of the heat to the guards. The periphery of the cylindrical frame is provided with a series of openings p^4, leading to its interior, adjacent to the outer surfaces of the guards P P', so that an outward circulation of air is established along the exterior walls of the guards, as well as along the exterior walls of the cylinder.

The operation of my invention is as follows: Supposing the engine to be in the position shown in the accompanying drawings, which position is the most difficult one in which to start the engine, the frame is positively rotated in some suitable manner, the first portion of the movement serving to permit the exhaust-valves J to close. As the frame is rotated the piston-heads E E' are positively drawn inwardly, this movement causing a vacuum in the cylinder-chamber, and thereby opening the gas-inlet valves G to permit the gas to flow into the interior of the cylinder-chamber. The springs *j'* of the exhaust-valves J are of sufficient tension to prevent the said valves from being opened by the vacuum which will open the gas-inlet valves G. After the frame has been rotated half a revolution the piston-heads will be caused to move outwardly toward the outer ends of the cylinders, thus compressing the gas which has been admitted into the chambers and positively closing the valves G. As the piston-heads reach the limit of their outward movements the sparking device is operated, thus igniting the gas. The ignited gas will drive the frame half a revolution before the exhaust-valves J will be positively opened, and during the next half of the revolution the valves J are held open to permit the escape of the spent gas into the hood K. The rotary movement of the frame and its cylinders may be utilized for driving in any desired manner.

While I have described my invention in connection with a rotary gas-engine of the explosive type, it is evident that different portions of the structure hereinbefore described may be used to great advantage in rotary engines driven by different motive power than gas—as, for instance, rotary steam-engines or rotary compressed-air engines and the like.

It is evident that changes might be resorted to in the form and arrangement of the several parts without departing from the spirit and scope of my invention. Hence I do not wish to limit myself strictly to the structure herein shown and described; but

What I claim is—

1. In a rotary gas-engine, a rotary frame, a cylinder carried thereby, a reciprocating piston within the cylinder, a gas-inlet, a valve therefor, a spring for yieldingly holding the valve closed and a counterbalance for the valve separate from and independent of the spring, substantially as set forth.

2. In a rotary gas-engine, a stationary shaft, a rotary frame mounted thereon, a cylinder carried by the frame, a reciprocating piston, a gas-inlet and a gas-exhaust for the cylinder, a gas-exhaust valve, a spring for yieldingly holding the valve closed, a counterbalance for the valve separate from and independent of the spring and means for positively closing the valve comprising a rotary cam-gear carried by the cylinder-frame and a stationary pinion intermeshing therewith carried by the stationary shaft, substantially as set forth.

3. In a rotary gas-engine, a rotary frame, a cylinder carried thereby, a reciprocating piston within the cylinder, a gas-inlet, a valve therefor, a counterbalance for the valve con-

sisting of a weighted lever engaging the valve-stem and means for yieldingly holding the valve closed, substantially as set forth.

4. In a rotary gas-engine a stationary shaft, a rotary frame mounted thereon, a cylinder carried by the frame, a reciprocating piston, a gas-inlet and a gas-exhaust for the cylinder, a gas-exhaust valve, a counterbalance therefor consisting of a weighted lever engaging the valve-stem, means for yieldingly holding the valve closed and means for positively opening the valve comprising a rotary cam-gear carried by the cylinder-frame and a stationary pinion intermeshing therewith carried by the stationary shaft, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 17th day of July, 1899.

WILLIAM M. EVERETT.

Witnesses:
FREDK. HAYNES,
GEORGE BARRY, Jr.