F. UHTBROCK.

ROTARY EXPLOSIVE ENGINE.

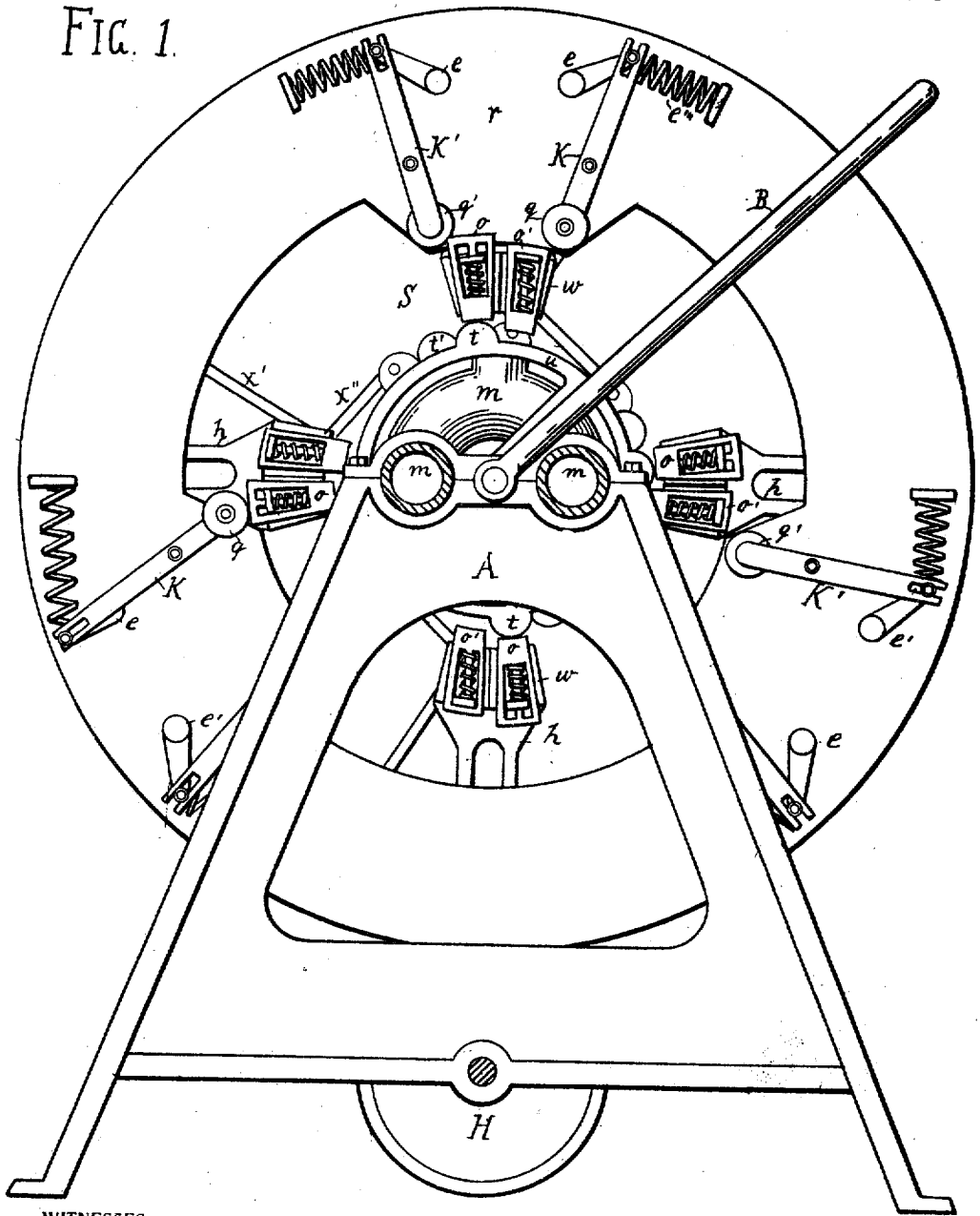
APPLICATION FILED SEPT. 26, 1908.

1,012,115.

Patented Dec. 19, 1911.

4 SHEETS—SHEET 1

FIG. 1.



WITNESSES

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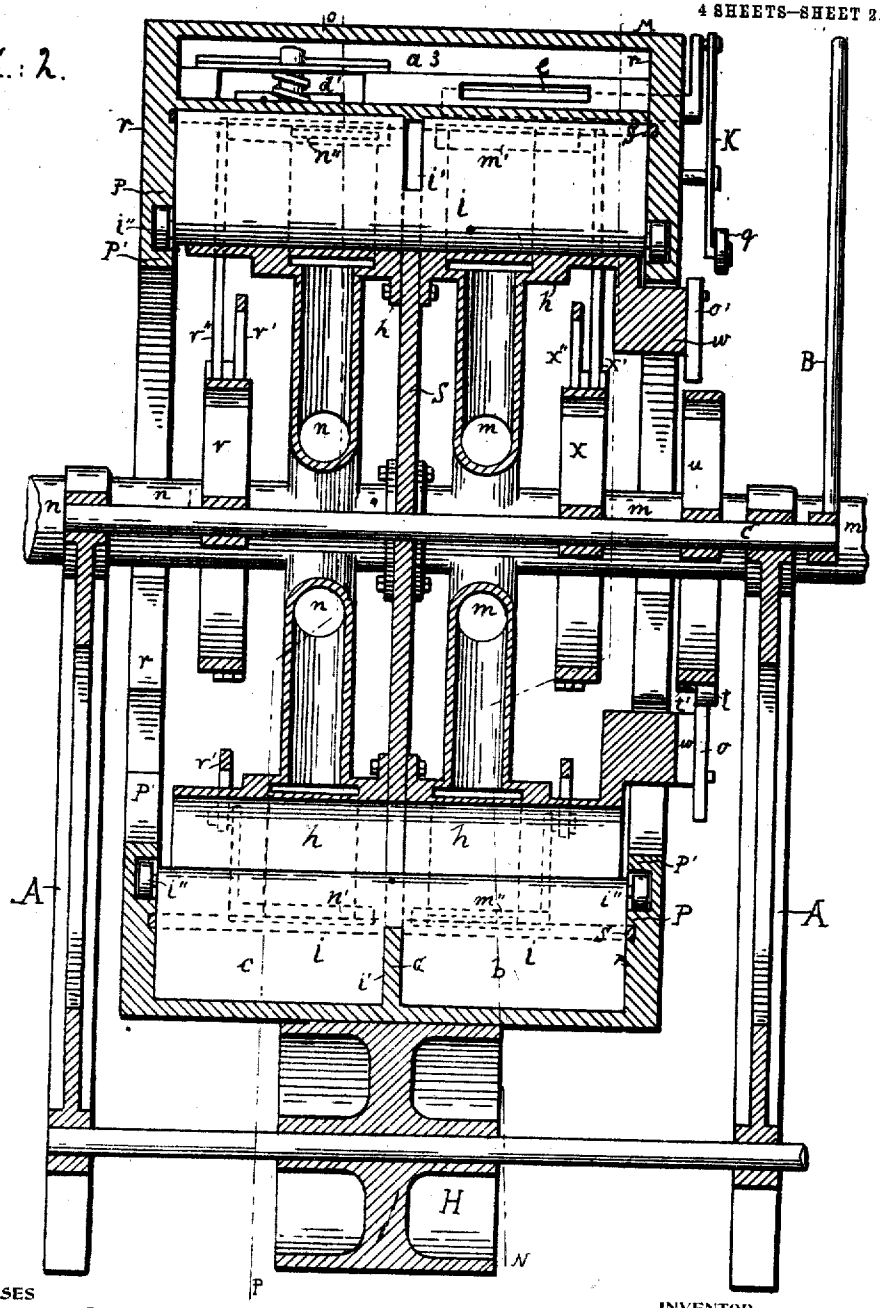
4 SHEETS—SHEET 2.

FIG. 2.



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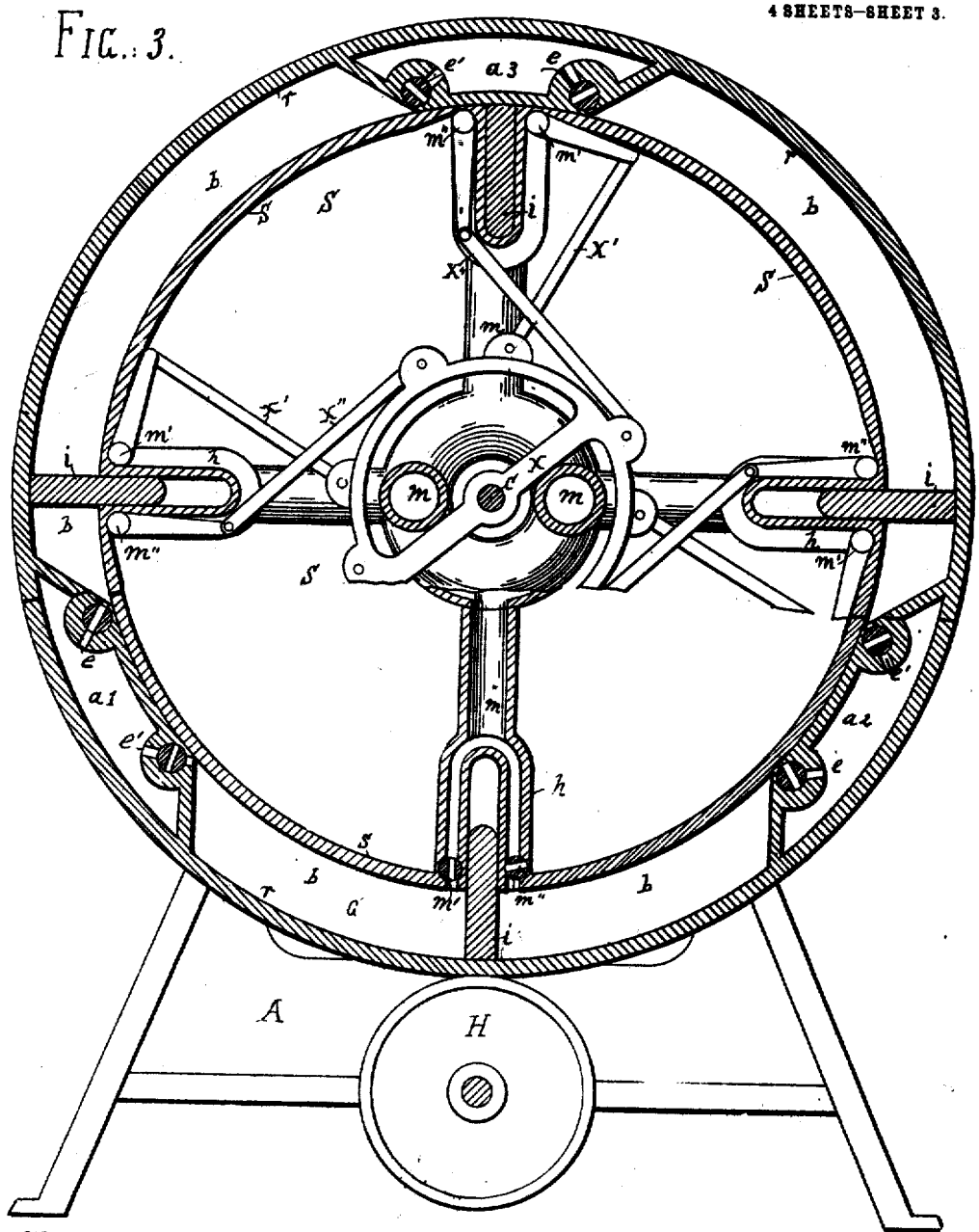
4 SHEETS—SHEET 3.

FIG. 3.



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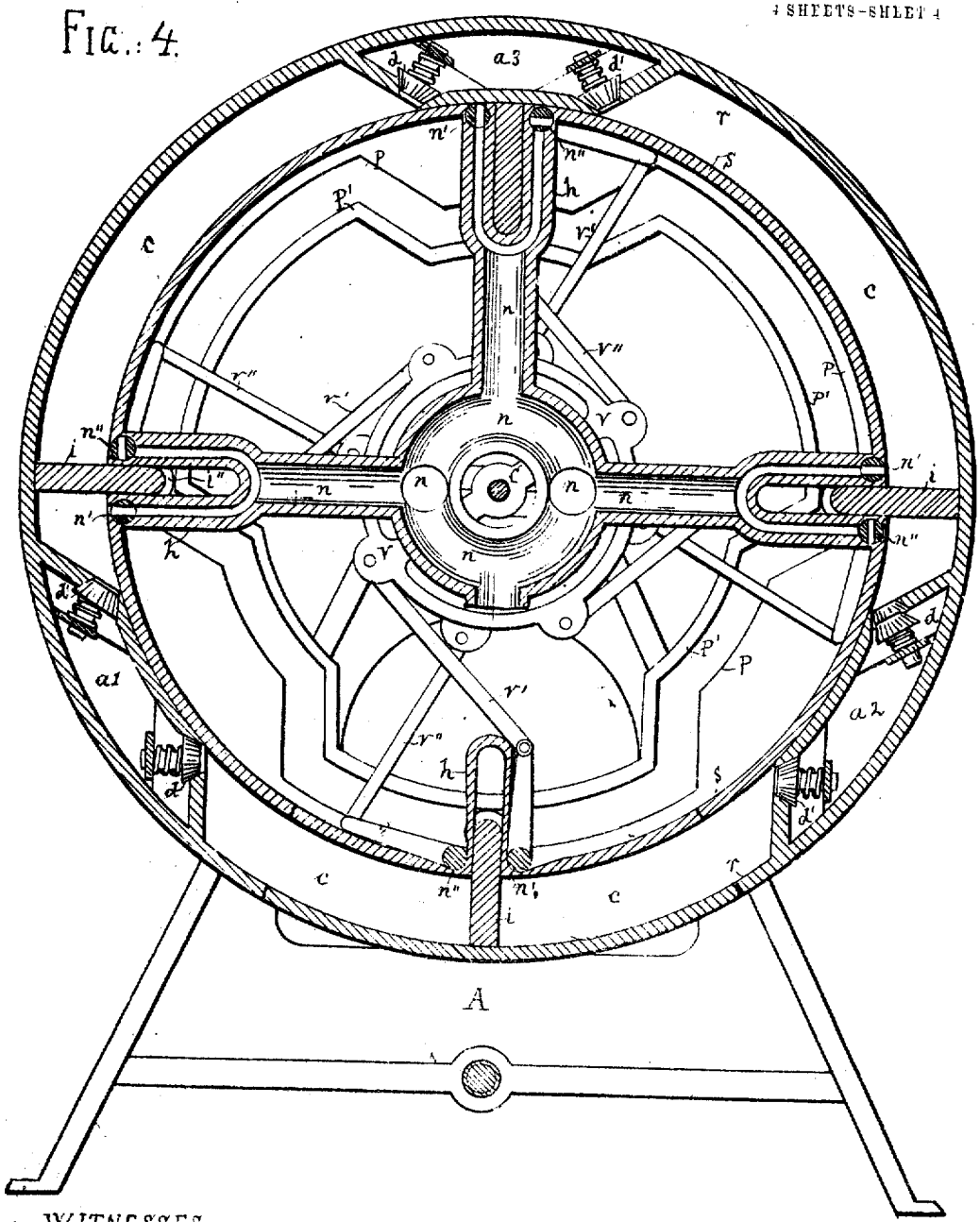
4 SHEETS-SHEET 4.

FIG. 4.



WITNESSES

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FREDERICK UHTBROCK, OF NEW YORK, N. Y.

ROTARY EXPLOSIVE-ENGINE.

1,012,115. Specification of Letters Patent. Patented Dec. 19, 1911.

Application filed September 25, 1908. Serial No. 454,817.

To all whom it may concern:

Be it known that I, FREDERICK UHTBROCK, a subject of the German Emperor, residing at New York, in the county and State of New York, have invented a new and useful Rotary Explosive-Engine, of which the following is a specification.

My invention relates to rotary explosive engines, and the object of my invention is to provide a self-contained, reversible, economical and controllable rotary explosive engine.

I attain this object by a mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a side-elevation of that side of my engine, that contains the explosion chambers; Fig. 2 is a vertical cross-section of Fig. 1; Fig. 3 is a vertical longitudinal section on line M N in Fig. 2, as seen in the direction of the arrow R; Fig. 4 is a vertical longitudinal section on line O P in Fig. 2, as seen in the direction of the arrow R in Fig. 2.

The same reference characters denote the same parts throughout the several views.

The annularly grooved rotor r is mounted rotatably on the rim of the stator s, circumferentially surrounding the latter; the groove of the rotor r and the outer rim of the stator s may be said to form the circular tube rs. The rotor r is provided with the three tapered pistons a', a^2 and a^3, which divide the chamber rs into the three chambers bc. Furthermore the rotor r comprises the three partitions g, which divide the chambers bc radially longitudinally into the explosion chambers b and the compression chambers c. Each of the pistons a', a^2 and a^3 is hollow and provided with spring-seated inlet-valves d and d', opposite the compression chambers c (see Figs. 2 and 4), and with outlet-valves e and e', opposite the explosion chambers b (see Figs. 1, 2 and 3). The valves e and e' are plug-valves, they extend with one end through the wall of the rotor r, and are provided with cranks e'', and closed by the springs e'''. The cranks e'' are engaged by the slotted ends of the fulcrumed levers K. The levers K, that engage the cranks e'' of the valves e, are provided, at their free ends and their side farthest from the body of the engine, with rollers q, the levers K, that engage the cranks e'' of the valves e', are provided, at their free ends and at their side nearest to the body of the engine, with rollers q'. The rollers q are situated in a plane different from that of the rollers q'. The two pairs of guides, p and p', are fastened to and carried by the rotor r, and preferably integral therewith. The stator s has the form of a circular disk surrounded by a cylindrical ring, the ring forming the rim of the stator. The four lugs h are fastened to the stator s, to and near the inside of the rim, and at an equal distance from each other. Each of the lugs h forms a frame for a radially reciprocatable abutment i, and holds two induction-valves n' and n'', opposite the compression chambers c, and two exhaust-valves, m' and m'', opposite the explosion chambers b, and the feed-conduits n and the exhaust-conduits m. The valves n' and m'' are situated at one side of the slide of the abutment i, and the valves n'' and m' are placed on the other side. The conduits n conduct the explosive mixture into the compression chambers c by way of the valves n' or n''; the conduits m receive the exploded gases by way of the exhaust-valves m' or m''. The conduits n are securely fastened to the stator s and in the standard A; the conduits m support the other side of the stator by means of the standard A'. Each abutment i is provided with a cut i', into which fit the partitions g, and two rollers i'', which are engaged by the guides p and p' in such a manner that the guides p' feed the abutments i into the chambers c and b, and that the guides p guide the abutments out of the way of the pistons g. The shaft C runs through the center of the engine and turns in bearings held by the standards A and A' and the disk of the stator s. Fastened on the shaft C are the lever B and the wheels v, x and u.

Pivoted to the wheel v are the connecting-rods v' and v'', which again are connected to the cranks of the valves n' and n'' by pins in such a manner, that they close the valves n' when they open the valves n'', and vice versa. The wheel x is connected with the cranks of the valves m' and m'' by means of the rods x' and x'' in the same manner as the wheel v is connected with

the valves n' and n''. The valves n' will close when the valves m' close, and the valves n'' will be actuated the same as the valves m''. The wheel u is provided with segmentary projections t and t'; the projections t are adapted to put the four contacts o in position to engage the rollers q of the levers K; the projections t' are adapted to put the contacts o' in position to engage the rollers q'. The contacts o and o' are set radially slidable on beds w in such a manner, that the contacts o are situated in the same plane as the projections t and the rollers q, and the contacts o' are situated in the same plane as the projections t' and the rollers q'. Each of the contacts o and o' is provided with an arm, which holds an electrical contact 2. The electrical contacts 2, held by the arms of the contacts o, are adapted to close an electrical circuit by means of the rollers q, after the latter have been disengaged from the contacts o. The electrical contacts 2, held by the contacts o', are adapted to close a circuit by means of the rollers q'. The beds w are fastened to the lugs h. A spark-plug l is situated near each valve e or e', and electrically connected with the roller q or q' that by means of its lever K controls said valve e or e'.

The roller H is no part of my invention, but it is a means to lessen the wear caused to the upper part of the rim of the stator by the weight of the rotor, or to transfer the movement of the rotor to a shaft.

The operation of my engine may be explained as follows: The rotor r is rotating in the direction of the arrows, the induction-valves n' and the exhaust-valves m' are open, the contacts o are in position to engage the rollers q. The guides p' force the abutments i into the chambers b and c, the guides p guide the abutments i out of the way of the pistons a. The piston a' has just passed an abutment. The part of the piston a', that faces the compression chamber c, sucks the gas-mixture into the space it creates between itself and the abutment just passed. The space in front of the piston a' is shut off by the next abutment and has been filled with gas-mixture by the piston a^2; as the valves n'' are closed, there is no way for the gas to escape, and it is pressed into the piston a' through the valve d. It will be seen that each of the three pistons steadily sucks the explosive mixture into the compression chambers c, and at the same time compresses into its own chamber the mixture drawn in by the preceding piston. This constitutes the intake and compression process of my engine and takes place at one side of the partitions g, while at the other side of said partitions the combustion and the exhausting process take place. The piston a' has just passed an abutment i; the contact o, situated near said abutment, has intercepted the roller q (of the lever K, connected with the valve e of the piston a',) and by means of the lever K and the crank e'' has opened the valve e; the gas, compressed into the piston a' before the latter passed the abutment i, enters the space of the chamber b between the piston a' and the abutment i; as soon as the roller q has passed the contact o, the spring e''' will close the valve e; the roller q, swung back into its usual position, will be contacted by the electrical contact 2, close the electrical circuit and cause the spark-plug l to ignite the charge. While driven forward by the expansion of the exploded gases, the piston a' drives such gas as has been left in the chamber b from a previous explosion, through the exhaust-valve m'. It will be seen that an explosion takes place every time, when a piston passes an abutment. As there are three pistons and four abutments, there will be twelve explosions in one revolution of the rotor at twelve different times.

To reverse the engine, the lever B and by means of it the axis C and the wheels u, x and v are turned to the left. Now the projections t will release the contacts o, which are drawn by their springs out of the reach of the rollers q; the valves e will not be opened any more and no more explosions can take place on that side of the pistons. The projections t' will put the contacts o' in position to engage the rollers q', so that the valves e' may be opened, and explosions may take place on the reverse side of the pistons. The valves n' and m' are closed and the valves n'' and m'' are opened. The exploded gases in back of the pistons escape through the valves m'', the gases in front of the pistons have no way to escape, and they will form air-cushions which, when their resistance equalizes the momentum of the rotor, will rebound and start the rotor in the reverse direction. Then the motor will take in explosive mixture through the valves n'', the pistons will take in the compressed mixture through the valves d' and give out charges through the valves e', and explosions will take place at the reverse side of the pistons a, the exploded gases will be exhausted through the valves m''.

To stop the engine in an economical way, the lever B may be turned only enough to disengage the contacts o or o', while the valves n' or n'' and m' or m'' are left partly open; then no more explosions will take place, while the momentum of the rotor will continue to compress explosive mixture or air into the pistons, so that part of the surplus energy will be stored in the hollow pistons.

As a cooling means, I have shown the ribs D, and any cooling means may be used, but

I think that, under ordinary circumstances, no extra cooling means is necessary, as a very large surface of the engine is rotating and exposed to the surrounding air.

I have shown no lubricating system, but any suitable system may be used.

It is apparent that many other variations and modifications may be made in the construction and arrangement of my invention without departing from the spirit and scope of my invention, and I therefore claim the right to all such variations and modifications as properly fall within the scope of my invention and the terms of the following claims.

Having thus shown and described my invention I claim and desire to secure by Letters Patent—

1. In a rotary explosive engine, a stator formed by a circular disk with a cylindrical rim; an annularly grooved rotor circumferentially surrounding said stator and rotatably mounted on the rim of the latter and forming a circular chamber with the same; three hollow pistons integral with or fastened to said rotor and dividing the circular chamber formed by the rotor and the stator into three chambers; partitions carried by the rotor and the pistons and located in the plane of the circular disk of the stator and running parallel to the sides of the rotor and dividing the chambers formed by the stator, the rotor and the pistons into compression and explosion chambers; inlet and outlet valves located in the pistons, the inlet valves facing the compression chambers, and the outlet valves facing the explosion chambers; radially reciprocatable abutments provided with rollers and having cuts into which fit the before-mentioned partitions; four lugs integral with or fastened to the stator, forming frames for said abutments; valved feed-ports situated one on either side of the frames of the abutments and leading into the compression-chambers; valved exhaust-ports situated one on either side of the frames of the abutments and communicating with the explosion-chambers; guides carried by the rotor and adapted to guide the abutments into the compression and explosion chambers and out of the way of the pistons by means of the rollers fastened to the abutments; means to open the outlet valves of the pistons at and for a predetermined time; means to ignite the charges in the explosion chambers at the proper time; and means to open or to close the feed and exhaust valves and means to set in position the means that operate the outlet valves of the pistons; means of supply leading to the feed-ports and means to conduct the exhaust away from the exhaust ports; all substantially as described.

2. In a rotary explosive engine, a stator fixedly mounted and formed by a circular disk surrounded by a cylindrical rim; an annularly grooved rotor circumferentially surrounding said stator and rotatably mounted on the rim of the latter and forming a circular chamber with the same; one or more hollow pistons carried by said rotor; and situated across the chamber formed by the stator and the rotor; inlet and outlet valves situated in the pistons; partitions carried by the rotor and the pistons extending in the direction of the radius and concentric with the rim of the stator, and dividing the chambers formed by the stator, the rotor and the pistons into compression and explosion chambers in such a manner that the compression chambers run parallel to the explosion chambers and both have the same radius; the compression chambers facing the inlet valves of the pistons, the explosion chambers facing the outlet valves of the pistons; one or more radially reciprocatable abutments provided with cuts into which fit the before-mentioned partitions; lugs integral with or fastened to the stator and forming frames for the abutments; feed-ports situated in the stator and leading into the compression chambers; exhaust-ports situated in the stator and communicating with the explosion chambers; means adapted to cause the reciprocatable abutments to take a position across the compression and explosion chambers and to slide out of the way of the rotating pistons; means to open the outlet valves of the pistons at and for a predetermined time; means to ignite the charges in the explosion chambers; means of supply leading to the feed-ports and means to conduct the exhaust away from the exhaust ports; substantially as described.

3. In a rotary explosive engine, a stator having a cylindrical rim; an annularly grooved rotor mounted on said rim forming a circular chamber with the same, hollow pistons carried by the rotor and situated across the chamber formed by the stator and the rotor; partitions carried by the rotor and the pistons and dividing the chambers formed by the stator, the rotor and the pistons into compression and explosion chambers in such a manner that the compression chambers run parallel to the explosion chambers and within the same radius; inlet and outlet valves situated in the pistons, the inlet valves facing the compression chambers, and the outlet valves facing the explosion chambers; radially reciprocatable abutments provided with cuts into which fit the before-mentioned partitions; lugs integral with or fastened to the stator and forming frames for the abutments; feed-ports located in the stator and leading into the compression chambers; exhaust-ports located in the stator and communicating with the explosion chambers; means adapted to cause the abutments to slide into the com-

pression and explosion chambers and out of the way of the rotating pistons; means to open the outlet valves of the pistons; means to ignite the charges; means of supply leading to the feed-ports and means to conduct the exhaust away from the exhaust-ports; substantially as described.

In testimony whereof I have signed my name in the presence of the subscribing witnesses.

FREDERICK UHTBROCK.

Witnesses:
ETSON L. FREESE,
LINCOLN A. BORTHWICK.