T. J. LOFTUS.

EXPLOSIVE ENGINE.

APPLICATION FILED JULY 12, 1915.

1,166,999.

Patented Jan. 4, 1916.

2 SHEETS—SHEET 1.

Fig. 1

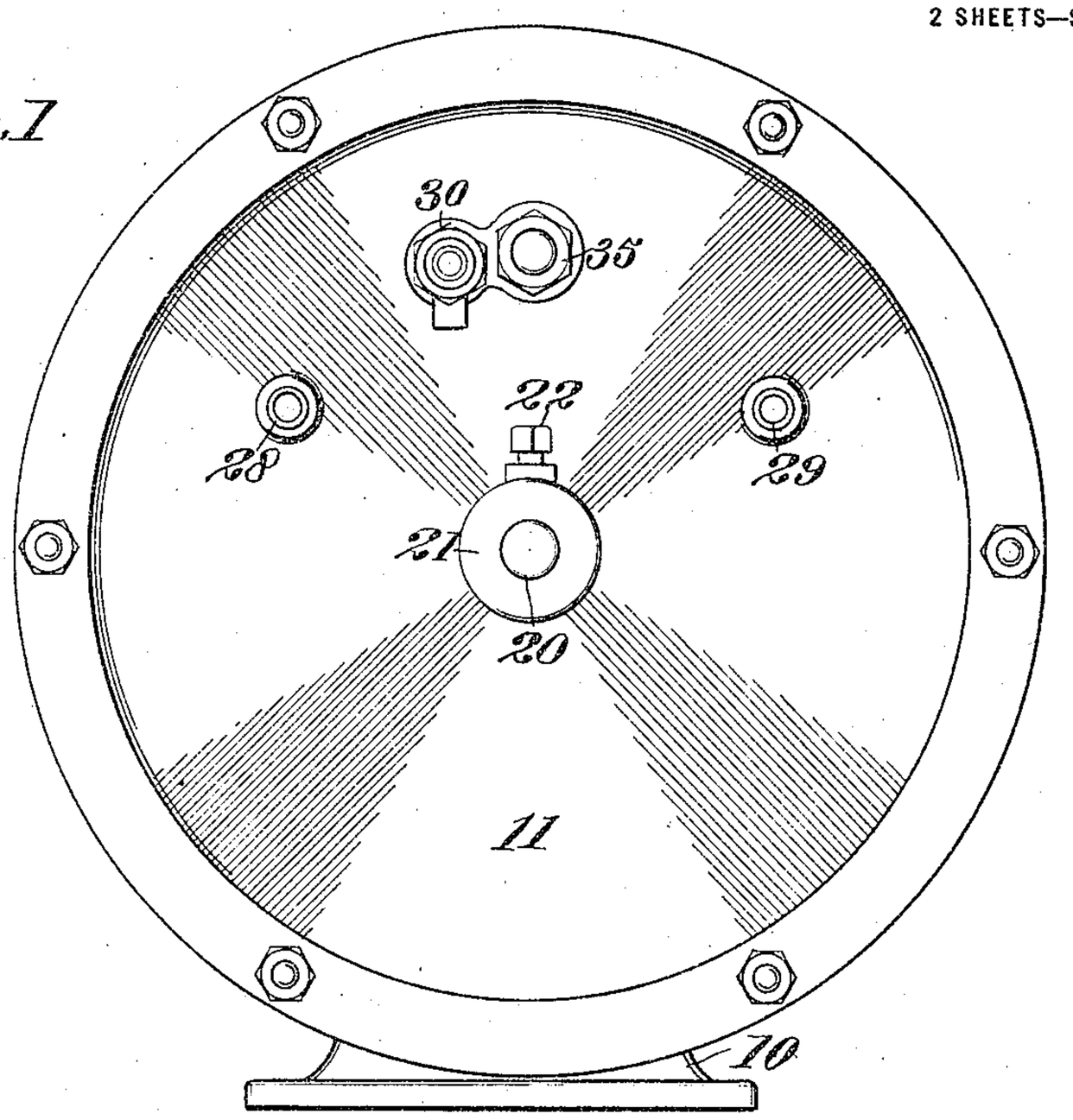

Fig. 2.

WITNESSES:

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Thos. Castleberg.

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2 SHEETS—SHEET 2.

Fig. 3

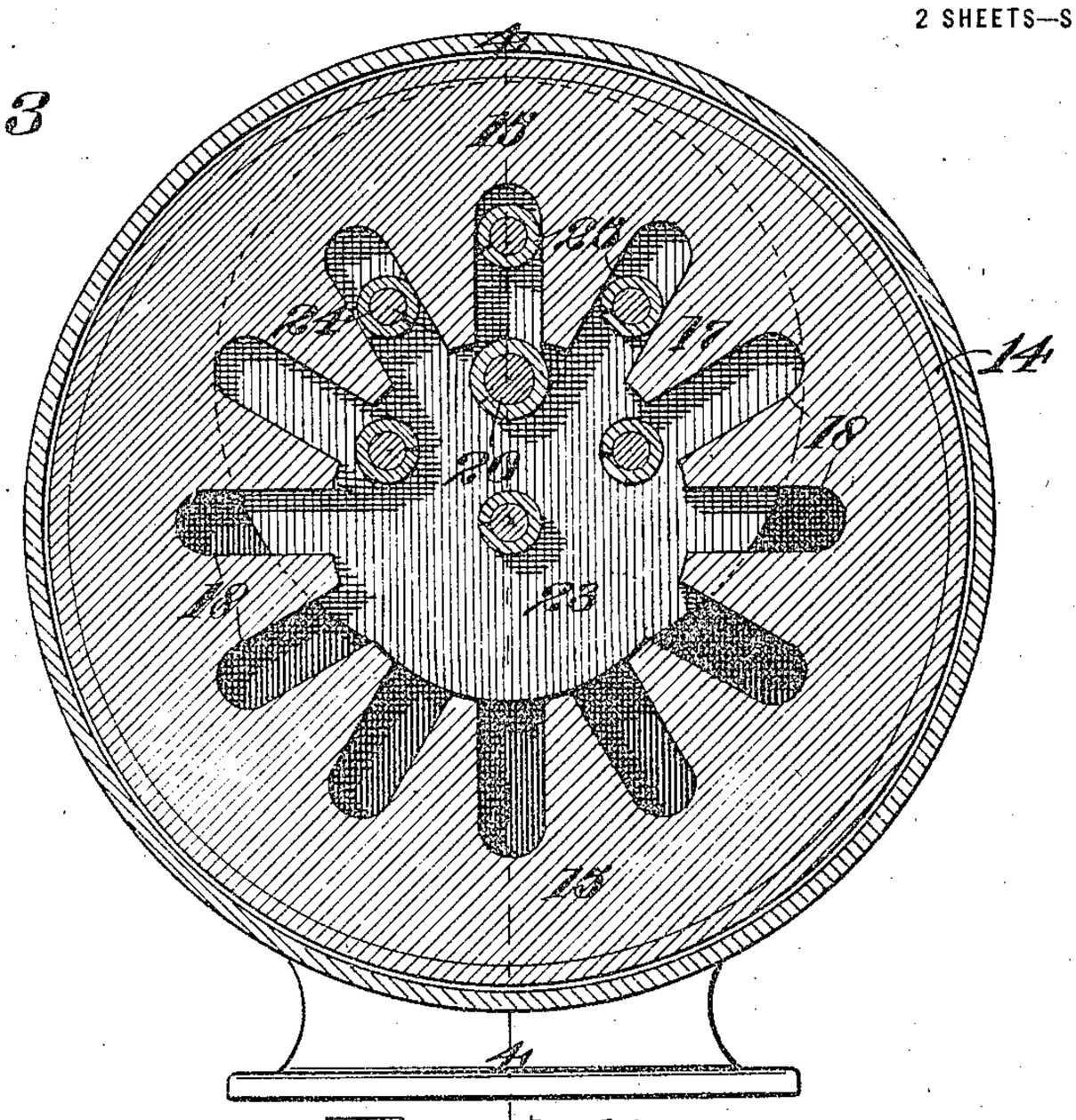

Fig. 4.

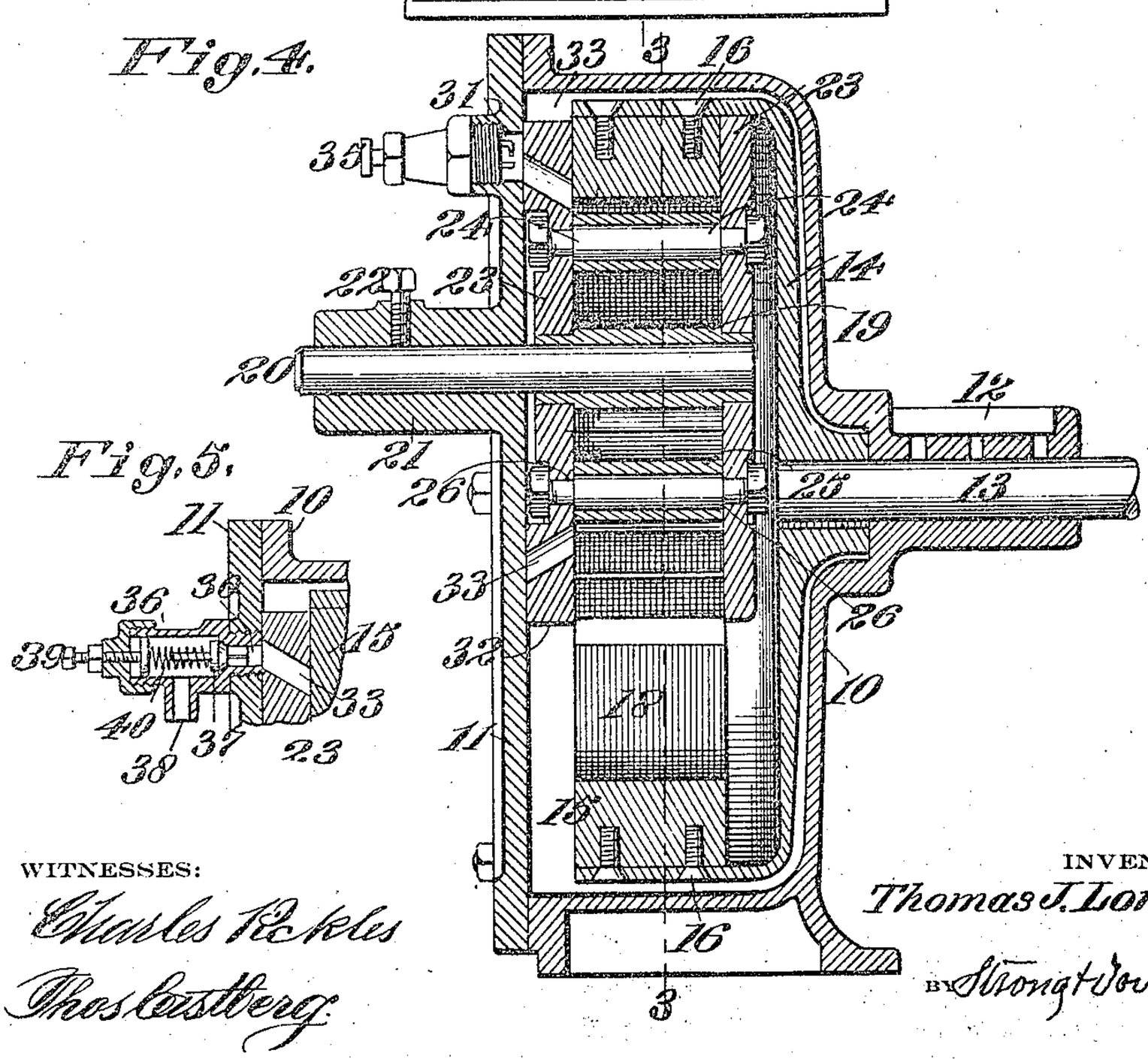

Fig. 5.

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UNITED STATES PATENT OFFICE.

THOMAS J. LOFTUS, OF CASTELLA, CALIFORNIA, ASSIGNOR OF ONE-HALF TO HARMON BELL, OF OAKLAND, CALIFORNIA.

EXPLOSIVE-ENGINE.

1,166,999. Specification of Letters Patent. Patented Jan. 4, 1916.

Application filed July 12, 1915. Serial No. 39,281.

To all whom it may concern:

Be it known that I, THOMAS J. LOFTUS, a citizen of the United States, residing at Castella, in the county of Shasta and State of California, have invented new and useful Improvements in Explosive-Engines, of which the following is a specification.

This invention relates to explosive engines, and has for its object to simplify and improve the construction and operation of a device of the character illustrated and described in my Patent No. 1,093,278, dated April 14, 1914.

In carrying out the object of the present invention I substitute for the internal spur gear of my former patent a gear having a plurality of tapered teeth, forming between them radially disposed, elongated slots having parallel faces, within which is arranged a lantern gear, the pin teeth of which operate within the slots, and the side faces of which inclose the sides of the slots. By changing the form of the gearing I obtain what is in effect a piston stroke of appreciable length, by reason of which greater power is derived, and I am enabled to dispense with one of the pinions heretofore employed and thereby greatly simplify the construction.

One form which my invention may assume is exemplified in the following description and illustrated in the accompanying drawings, in which—

Figure 1 shows a front elevation of a device embodying my invention. Fig. 2 shows a similar view with the cover plate removed. Fig. 3 shows a circumferential, central, sectional view of the same and is taken on the line 3—3 of Fig. 4. Fig. 4 shows a transverse, central, sectional view and is taken on the line 4—4 of Fig. 3. Fig. 5 shows a detail sectional view of the relief valve employed in my device.

Referring in detail to the form of my device illustrated herewith, it will be seen that it comprises a casing 10, cylindrical in form and provided with a removable head 11. A hub 12 is formed on the end opposite the removable head, within which is journaled a shaft 13 constituting a power shaft of the motor. Fixed upon the shaft 13 is a shell 14 carrying on its annulus a toothed rim 15, preferably held in place by means of screws 16. The rim 15 has its teeth 17, formed upon its annulus, tapered in such a way as to form elongated slots 18 between them.

A pinion or inscribed gear 19 is mounted within the casing 10, being journaled upon a shaft 20 carried in an elongated bearing 21 formed upon the cover plate 11 and eccentric to the shaft 13. The shaft 20 is held against turning within the bearing 21 by means of a set-screw 22. The pinion 19 is similar in shape to a lantern gear, being made up of spaced face-plates 23, between which are positioned pins 24 carrying sleeves or rollers 25 forming the teeth of the gear and adapted to mesh with the internal teeth of the surrounding gear. The pins 24 are provided with shoulders 26 to hold the face-plates rigidly spaced, and nuts 27 are employed for retaining the parts in position.

Upon the cover plate 11 are arranged, in proper relation, an inlet port 28, an exhaust port 29, a relief port 30, and an ignition port 31. The adjacent face-plate of the lantern gear is provided with an outstanding rim portion 32 forming a close fit with the inside surface of the cover plate, and has arranged in proper order thereon an ignition port 33 in radial alinement with each of the pins 24 and adapted to register with the ignition port 31 and relief port 30 on the cover plate. Adjacent to each of the pins 24 is a second port 34 answering for both inlet and exhaust purposes and adapted to register with the ports 28 and 29 in the cover plate.

Fitted within the ignition port 31 is a spark plug 35 adapted to be connected with a spark coil (not shown) to give a constant vibrating spark. Fitted within the relief port 30 is a valve casing 36 carrying a spring-pressed valve 37 and having an opening 38 adapted to be placed in communication with the mixing chamber and supply tank (not shown) where the fuel is retained under pressure. A screw 39 is provided for adjusting the compression of the spring 40 whereby to vary the opening and closing of the valve.

In the operation of this engine, fuel is conducted from a mixing chamber or supply tank to the inlet port 28, and rotation of the gears in the direction of the arrow in Fig. 2 causes the charge to be compressed; the inlet port being so positioned as to register with one of the slots 18 at a time when

a pin 24 is starting to mesh therewith, as shown in dotted lines in Fig. 2. Continued rotation of the gears will cause the roller to be moved outwardly to the end of the slot, reaching its maximum movement at about the time the ignition ports are in register. The spark can be so timed as to occur after the pin 24 has passed dead center with its own axis and the axis of the circumscribing gear. Thereupon the explosion will cause the parts to be driven forwardly and the port 34, which previously served as an inlet port, will register with the exhaust port 29 at a time when the pin is practically withdrawn from the slot. Thereafter the slot is exposed to the atmosphere, having passed the face-plates of the lantern gear which previously inclosed its sides. Perfect scavenging of the compression chambers or slots will therefore be insured.

The relief valve heretofore described is for the purpose of regulating the compression in the slots. Its port is positioned so as to register with the ignition ports of the lantern gear near their end of movement within the slots, or slightly before ignition occurs. By connecting the relief valve to the supply tank or mixing chamber and adjusting the tension of the spring 40, the compression of gas in the slots can be maintained at any desired point and the excess pressure will be permitted to escape to the source of supply.

In practice I have found that twelve slots in the circumscribing gear and six pins or rollers formed upon the lantern gear give the best results, although it is obvious that these numbers may be varied. The rollers 25 reduce the friction between the parts by turning on opposite faces of the slots in entering and withdrawing. The provision of the pins 24, with nuts, makes it possible to draw the face-plates of the lantern gear into a tight sliding fit with the faces of the teeth 17, thereby sealing the sides of the adjacent slots and permitting a high compression of the gases when the rollers are moved within. It will be noted that one spark plug serves for all of the slots and that each charge of fuel is exploded successively as the meshed teeth are brought into proximity with the ignition port.

From the foregoing description the many advantages of my device will become apparent. A simple construction is thereby made possible and one in which connecting-rods, crank shafts, timing cams, etc., are not employed. Due to the atmospheric exposure of the compression chambers or slots my engine is self-cooling. Pure air always fills the slots and is trapped therein at the instant the rollers start to enter.

While I have shown and described but one form of my device herewith it will be understood, nevertheless, that it is susceptible of modification and, therefore, many changes may be made in the construction of the several parts without departing from the spirit of my invention as disclosed in the appended claims.

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

1. A motor of the successive impulse type, comprising a circumscribing gear provided with internal teeth forming between them parallel-faced, elongated slots constituting compression chambers, a lantern pinion within said gear having its pin teeth in mesh with said slots and its face-plates inclosing the sides of adjacent slots, means for conducting a charge of explosive mixture to said chambers to be compressed by the pistons, and means for exploding said charge to drive the parts, said means including ports contiguous to the pin teeth between the face plates, and a cover plate with successive inlet ignition and exhaust ports with which the face plate ports successively register.

2. A motor of the successive explosion type, comprising a circumscribing, rotatable member provided with a plurality of internal, radially disposed, parallel-faced, elongated slots constituting compression chambers, an inscribed rotatable member mounted eccentric to said circumscribing member, and comprising a pair of spaced face-plates inclosing the sides of adjacent slots, transverse pins between said face-plates, rollers on said pins, said rollers forming pistons to enter the slots, means for conducting a charge of explosive mixture to said chambers to be compressed by the pistons, said means including ports in the face plate contiguous to the pins, and inlet and exhaust ports in the cover plate, with which the face plates successively register during revolution, and means for exploding said charge to drive the parts.

3. A motor of the successive explosion type, comprising a circumscribing, rotatable member provided with a plurality of internal, radially disposed, parallel-faced, elongated slots constituting compression chambers, an inscribed rotatable member mounted eccentric to said circumscribing member, and comprising a pair of spaced face-plates inclosing the sides of the adjacent slots and carrying transverse pins to mesh with said slots, a casing for said rotatable members, ignition, inlet and exhaust ports arranged in said casing, a port in the adjacent face-plate of the inscribed member for each pin to register with the ignition port when the pin is near the limit of its compression movement, and a second port in said face-plate adjacent to each pin to register with the inlet port at the entrance of said pin into the slot and with the exhaust port at the withdrawal thereof.

4. A motor of the successive explosion type, comprising a circumscribing, rotatable member provided with a plurality of internal, radially disposed, parallel-faced, elongated slots constituting compression chambers, an inscribed rotatable member mounted eccentric to said circumscribing member carrying a plurality of perpendicularly arranged pins constituting pistons and arranged to operate in said slots, means for conducting a charge of explosive mixture to said chambers to be compressed by the pistons, a relief valve adapted to communicate with each of said slots near the point of greatest compression, said valve being in communication with the source of fuel supply, and means for exploding the compressed charge to drive the parts.

5. A motor of the successive explosion type, comprising a circumscribing, rotatable member provided with a plurality of internal, radially disposed, parallel-faced, elongated slots constituting compression chambers, an inscribed rotatable member mounted eccentric to said circumscribing member, and comprising a pair of spaced face-plates inclosing the sides of the adjacent slots and carrying transverse pins to mesh with said slots, a casing for said rotatable members, relief, ignition, inlet and exhaust ports arranged in said casing, a port in the adjacent face-plate of the inscribed member in radial alinement with each pin to register with the relief and ignition ports in said casing when the pin is near its limit of movement within a slot, and a second port adjacent to the first mentioned port to register with the inlet and exhaust ports in said casing near the beginning and end of travel of such pin within a slot.

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

THOMAS J. LOFTUS.

Witnesses:
WILLIAM RUFFUS CONANT,
HUGH C. NEWTON.