No. 640,237. Patented Jan. 2, 1900.

J. STRASZER.

ROTARY GAS ENGINE.

(Application filed Feb. 9, 1899.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

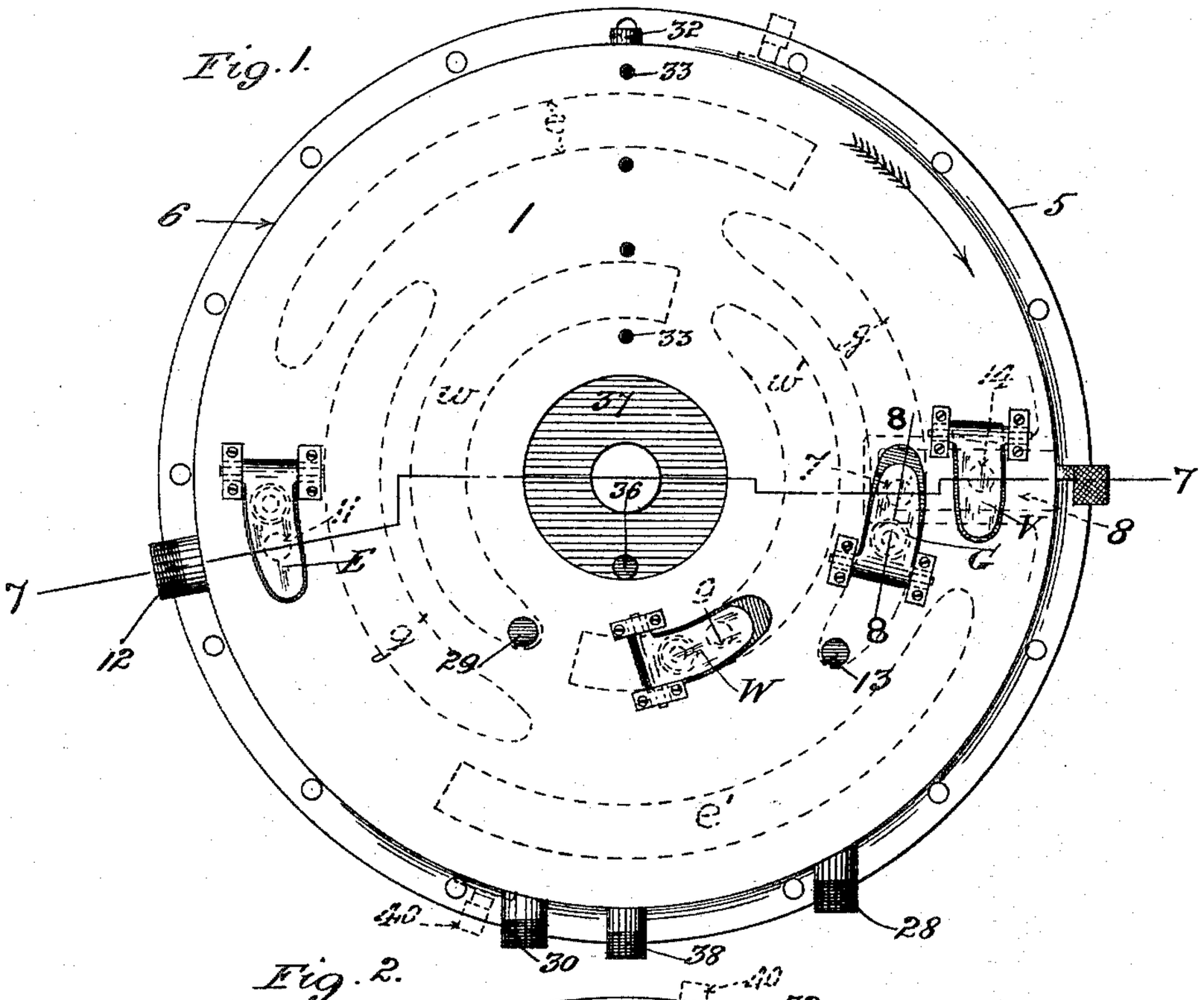
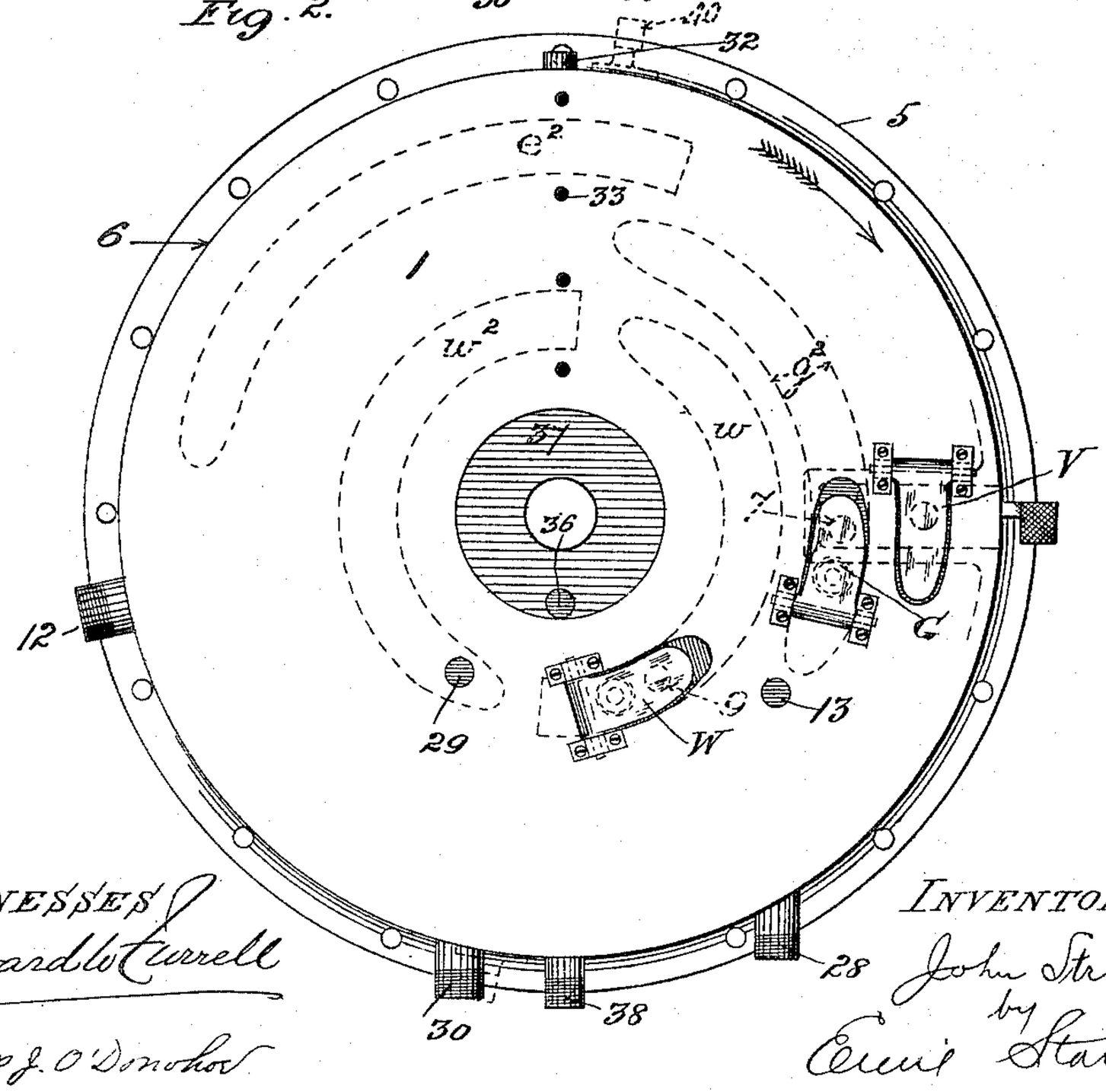


Fig. 2.



Witnesses
Edward D. Farrell
James J. O'Donohoe

Inventor,
John Straszer
by Emil Starck, Atty

No. 640,237. Patented Jan. 2, 1900.

J. STRASZER.

ROTARY GAS ENGINE.

(Application filed Feb. 9, 1899.)

(No Model.) 3 Sheets—Sheet 2.

Fig. 3.

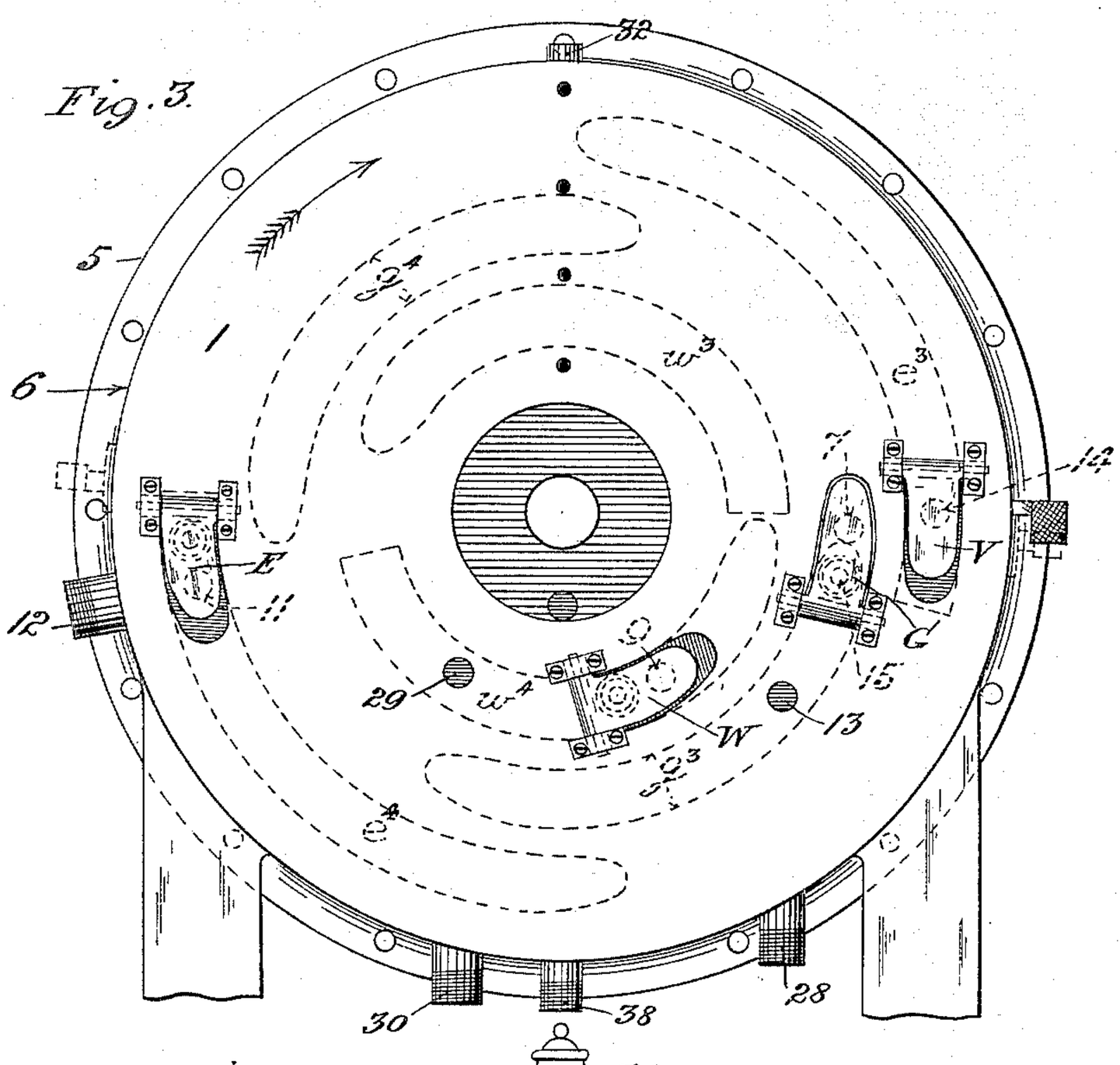
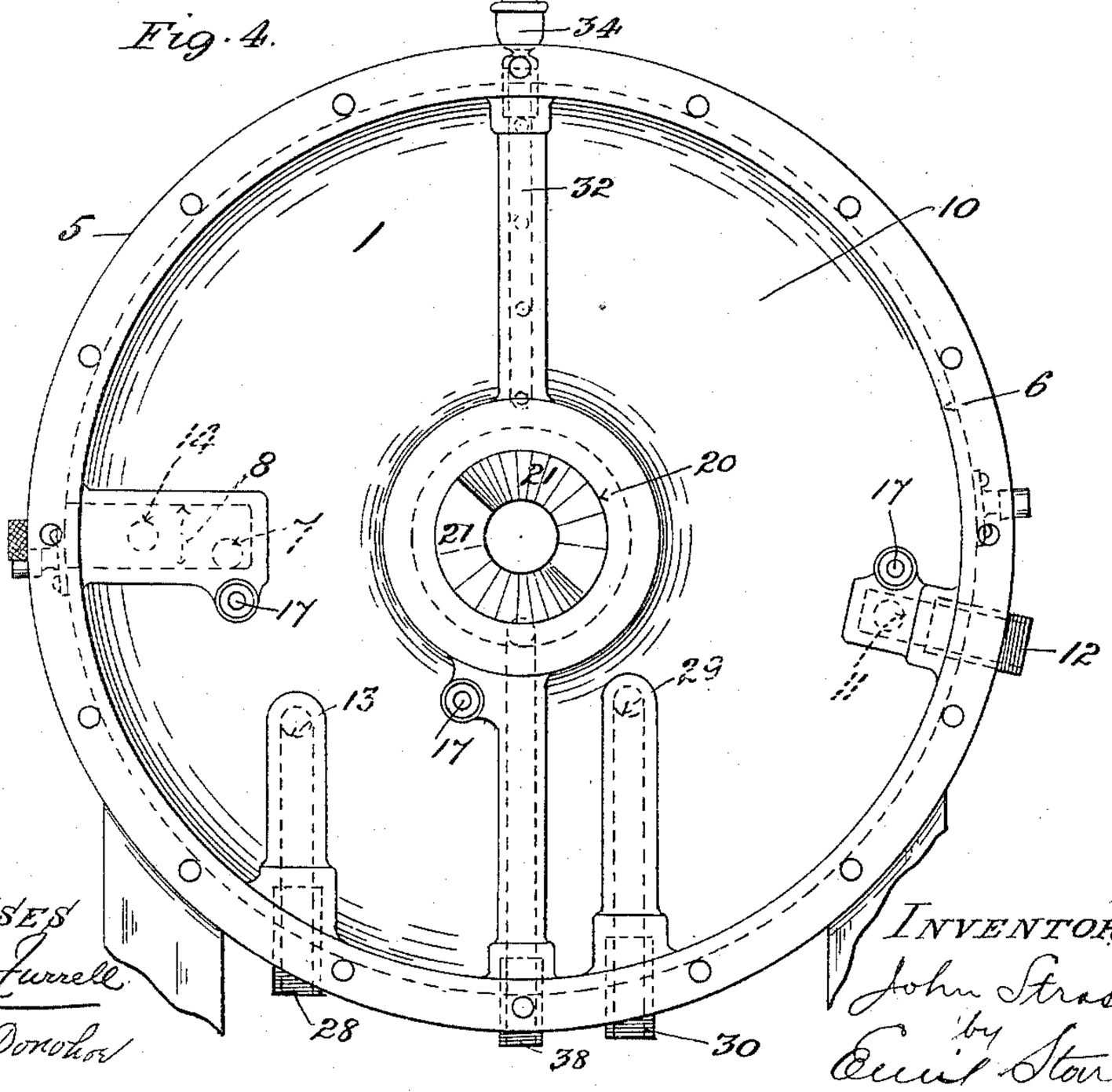


Fig. 4.



WITNESSES
Edward W. Turrell
James J. O'Donohoe

INVENTOR
John Straszer
by Emil Storck, atty.

No. 640,237. Patented Jan. 2, 1900.

J. STRASZER.

ROTARY GAS ENGINE.

(Application filed Feb. 9, 1899.)

(No Model.) 3 Sheets—Sheet 3.

Fig. 5.

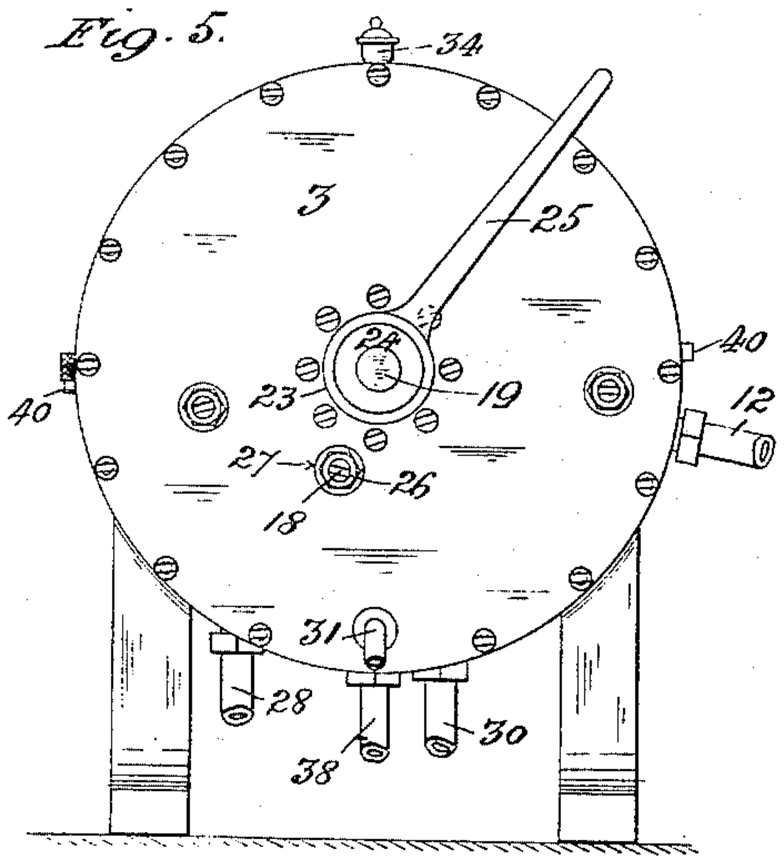


Fig. 6.

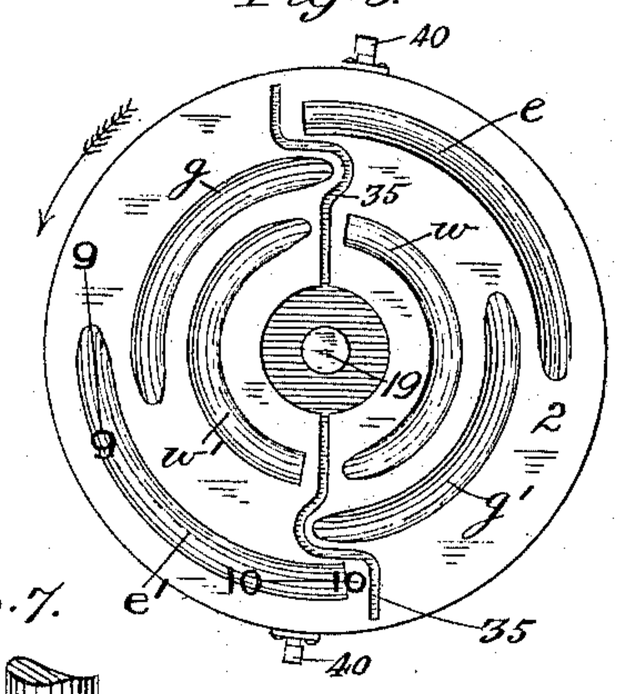


Fig. 7.

Fig. 8.

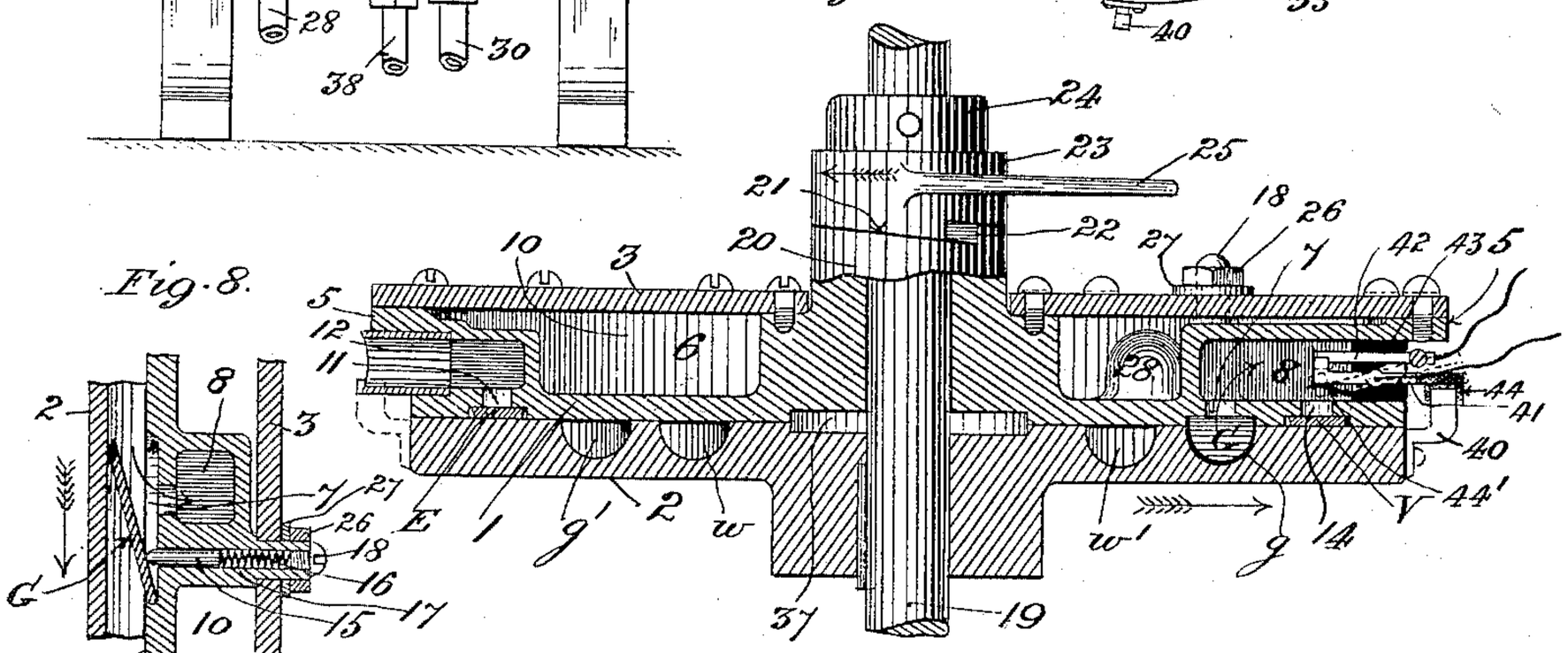


Fig. 9.

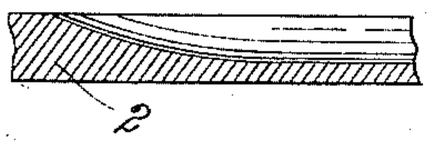


Fig. 10.

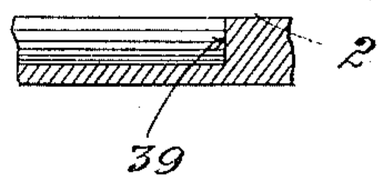
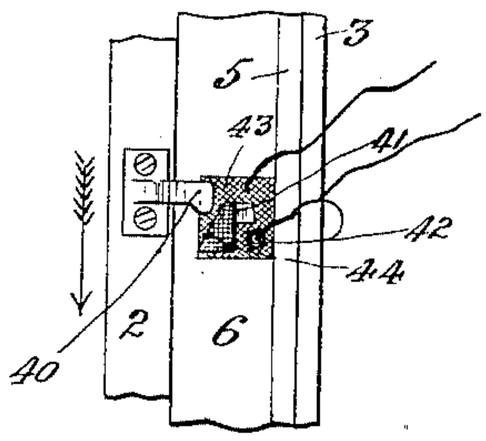


Fig. 11.



WITNESSES:
Edward W. Sewell
James J. O'Donohoe

INVENTOR,
John Straszer
by
Emil Stark, atty

UNITED STATES PATENT OFFICE.

JOHN STRASZER, OF MANCHESTER, MISSOURI.

ROTARY GAS-ENGINE.

SPECIFICATION forming part of Letters Patent No. 640,237, dated January 2, 1900.

Application filed February 9, 1899. Serial No. 705,064. (No model.)

To all whom it may concern:

Be it known that I, JOHN STRASZER, a citizen of the United States, residing at Manchester, in the county of St. Louis and State of Missouri, have invented certain new and useful Improvements in Rotary Gas-Engines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention has relation to improvements in rotary explosive-engines; and it consists in the novel arrangement and combination of parts more fully set forth in the specification and pointed out in the claims.

In the drawings, Figure 1 is a front elevation of the face-plate of the engine, the outer piston-disk being removed, but the pockets thereof being shown dotted to illustrate the position they occupy, relatively to the valves of the face-plate at the beginning of a revolution. Fig. 2 is a similar view showing the relative position of one set of pockets for the second position of the piston-disk. Fig. 3 is a similar view showing the third and fourth positions of the same pockets. Fig. 4 is a rear elevation of the face-plate, the cover-plate being removed. Fig. 5 is a rear elevation of the engine with cover-plate in place. Fig. 6 is a plan of the inner face of the piston-disk along which the pockets are disposed. Fig. 7 is a section of the assembled machine, taken in planes indicated by the zigzag line 7 7 on Fig. 1. Fig. 8 is a section on line 8 8 of Fig. 1, showing the construction and manner of operation of one of the spring-controlled valves of the face-plate, a portion of the pocket, however, being also illustrated. Fig. 9 is a sectional detail showing the tapering end of any one of the pockets, the section being indicated on line 9 9 of Fig. 6. Fig. 10 is a sectional detail showing the abrupt end of one of the outer pockets of the piston-disk, the section being indicated on line 10 10 of Fig. 6; and Fig. 11 is a detail of the outer end of the plug of the gas-chamber and parts adjacent thereto.

The object of my invention is to construct an explosive-engine of the rotary type which shall be compact, one whose parts are readily accessible, and one containing further and other advantages more apparent from a detailed description of the invention, which is as follows.

Referring to the drawings, 1 represents the stationary or face plate of the engine, 2 the rotating piston-disk, and 3 the cover-plate, the outer edge of the latter being bolted to a flange 5, formed along the adjacent edge of the circumscribing ledge or wall 6, forming a part of the plate 1. Along the front face of the plate 1 are disposed along concentric circles the various valves by which the influx of gas into and efflux of gas from the pockets of the piston-disk are controlled, as will presently appear. The several valves are hinged and open outwardly—that is to say, away from the front face of the plate 1—and into the respective pockets formed along the inner adjacent surface of the piston-disk, the latter rotating with the several pockets against the face-plate.

G represents the gas-valve, the same controlling a port 7 at the inner end of the gas-chamber 8.

W represents the water-outlet valve, the same controlling a port 9, communicating with the rear water-chamber 10, located between the face-plate 1 and cover-plate 3.

E represents the exhaust-valve controlling the exhaust-port 11 at the inner end of the exhaust-nozzle 12.

V represents the valve leading from the gas-chamber 8, also located along the rear face of the plate 1, said valve normally covering a port 14, leading from said chamber 8.

The several valves mentioned, with the exception of the valve V, are each forced to an open position by a plunger 15, actuated by a coiled spring 16, confined within a tubular casing 17, projecting from the rear of the face-plate, the outer end of the spring abutting against a screw-plug 18, by which its tension is regulated. The valve V is forced open by the explosion of the gas which takes place in the gas-chamber 8.

The drive-shaft 19, which carries the piston-disk, passes through the tubular hub or bearing 20 of the face-plate, the outer end of the hub terminating in two substantially semicircular (mathematically elliptical, however,) bearing-surfaces 21, the planes of which intersect one another, thus forming offsets or

shoulders 22. Mounted loosely on the shaft is a collar 23, having similar inclined bearing-faces adapted to ride over the faces 21, the opposite plane face of the collar being adapted to bear against a fixed collar 24, secured to the shaft, so that when the lever 25, carried by the collar 23, is seized and the latter turned in the direction shown by the arrow in Fig. 7, so as to cause the inclined faces thereof to ride up the inclined faces 21 of the hub, the effect will be to pull the shaft in a direction to draw the disk 2 firmly against the face of the plate 1. When once properly adjusted, the parts will remain in position by reason of the friction between the surfaces 21 and the adjacent surfaces of the collar 23 and by the weight of the lever. It is to be understood that this longitudinal adjustment of the shaft is very slight and only sufficient to effect a perfect and uniform contact between the piston-disk and the face-plate. The cover-plate 3 is passed over the hub 20 and tubular casings 17 and bolted directly to the flange 5 of the face-plate, the outer projecting ends of the casings 17 being screw-threaded, so as to receive a terminal nut 26 and washer 27 and insure a water-tight joint at that point, it being understood, as subsequently to be explained, that the space 10 between the rear of the face-plate and the cover-plate constitutes a water-chamber for cooling the several parts of the engine.

The inner surface of the piston-disk, or that surface which is in direct contact with the valve-supporting face of the face-plate, is provided with two series of pockets *g w e* and *g'*, *w'*, and *e'*, arranged in concentric circles, corresponding to those along which the valves G, W, E, and V are disposed, the latter, when forced open under either the action of the plungers 15 or by the explosion of the gas in the gas-chamber, opening outward against the walls of their respective pockets, as best shown in section in Fig. 8, the valve being forced to a closed position by the plane surface of the piston-disk as such surface comes opposite said valve during the revolution of the disk. (See Fig. 7.) Formed in the face-plate in the path of the circle along which the pockets *g g'* are described is an opening 13, communicating with the upper end of a conduit 28, disposed along the rear of the face-plate and passing through the lower wall of the water-chamber, said conduit or tube 28 being adapted to be coupled to a pipe (not shown) connecting with any source of gas-supply. Formed also in the face-plate in the path of the circle along which the pockets *w w'* are described is an opening 29, communicating with the upper end of a conduit 30, leading through the bottom of the water-chamber for coupling to any water-supply pipe. (Not shown.) Projecting from near the base or lower edge of the cover-plate is an overflow or water nozzle 31 to carry off the water from the water-chamber, as will more fully hereinafter appear. Disposed also along the rear wall of the face-plate is an oil-supply tube or conduit 32, closed at the bottom, but having openings 33 leading from along the length thereof through the face-plate, the oil being supplied from an oil-cup 34, mounted at the upper end of the said tube on the outside of the wall 6. The openings communicate with an oil-groove 35, disposed along the inner face of the piston-disk, the oil being thus carried between the contacting surface of the disk and face-plate, the drippings eventually finding their way, through an opening 36, located at the edge of a central depression 37 in the face-plate, into a drip pipe or tube 38 in the rear of the face-plate, said drip-pipe passing through the bottom of the water-chamber.

The operation of the engine is as follows: The piston-disk, if viewed from the inside, rotates in the direction shown by the arrow in Fig. 6, but when viewed so that the observer looks toward the outer face thereof the disk revolves as shown by arrow in Fig. 7 or as shown by arrows in Figs. 1, 2, and 3, in which the pockets of the disk are shown dotted (the disk itself being omitted) to illustrate the positions they occupy relatively to the valves in the course of a single revolution. Let us follow the piston-disk through a single revolution: Referring to Fig. 1, the forward end of the pocket *g* is open to the gas inlet or opening 13, allowing the gas to enter said pocket, the valve G, which is open under the circumstances and whose edge substantially conforms to the contour of the walls of the pocket, preventing the escape of the gas in that direction. At the same time the pocket *w* is open to the water-inlet opening 29, this pocket filling with water under the circumstances. The pocket *e* is removed from the exhaust-valve E for this initial position of the disk. As the latter rotates in the direction previously indicated the gas which becomes occluded in the pocket *g* will, for the second position of the pocket, (marked g^2 in Fig. 2,) escape through the port 7 into the gas-chamber 8, the pocket *w* having in the meantime delivered its water through the port 9 into the water-chamber in the rear of the face-plate and passed to the position as shown by w^2 in Fig. 2 to take in more water through the pipe 30. As the piston-disk continues its rotation the pocket *e* will come opposite the valve V of the gas-chamber, as seen in e^3 in Fig. 3, the pocket *g* will be in the position g^3 and valve G closed, and pocket *w* at w^3. When the disk is in this third position, the explosion which takes place at this moment in the gas-chamber, as presently to be described, forces the valve V open, the said valve serving as an abutment for the expanding gases, the said gases expending their energy against the terminal flat or plane abutting wall 39 of the pocket *e*. The disk is thus impelled onward until the pocket *e* comes opposite the exhaust-valve E, as shown by e^4 in Fig. 3, the valve E flying open and allowing the exhaust to escape through the port 11 into the atmosphere.

By this time the pocket *g* has reached g^4 and *w* has reached w^4. Thus the piston-disk has been traced for a complete revolution. To avoid complication, only the pockets *g*, *w*, and *e* have been traced, but the same explanation applies to pockets *g'*, *w'*, and *e'*. In practice of course it is not necessary that the pocket *g* shall make a complete revolution before any gas is delivered into the gas-chamber through the port 7 of the valve G, for before such complete revolution is made the gas from pocket *g'* will have been delivered into the gas-chamber and its force expended against the terminal wall of pocket *e'* in driving the disk forward; but it must be remembered that in the present description we are tracing the path of the gas from the beginning—that is, where both pockets *g g'* are empty. To avoid confusion, the intermediate positions of pockets *g'*, *w'*, and *e'* were omitted purposely from Figs. 2 and 3.

There are two explosions for every complete revolution of the piston-disk—that is to say, every time the pocket *e* and *e'* comes opposite the gas-chamber valve V. These explosions are produced by the following mechanism: Carried by the periphery of the piston-disk at points adjacent to the abutting wall 39 of each pocket *e e'* is a tripping-arm 40, which as the disk revolves trips or tilts a "wiper" or wiping-lever 41, forming one electrode of an electric circuit, the inner free end of the wiper normally contacting with the inner end of the opposite or fixed electrode 42. Both electrodes are mounted in an insulating-plug 43, which covers the outer opening of the gas-chamber, the wires (see Fig. 7) being connected in any approved manner to the electrodes. The outer end of the wiper carries a wedge-shaped head or knob 44, made of insulating material, the arm 40 striking the incline of said knob and tripping or tilting the wiper out of contact with the electrode 42, (see dotted position, Fig. 7,) the separation of the electrodes producing a spark and making the explosion of the gas mixture in the gas-chamber. The wiper is returned to its closed position by a spring 44'. The opposite or retreating ends of the pockets *e e'* flare gradually toward the inner surface of the disk, (see Fig. 9,) as also do the opposite ends of the pockets *g g'*, to enable the tapering ends of the valves to pass readily out of them as they are gradually forced to a closed position by the plane surface of the disk. The pockets *w w'* are formed similarly to pockets *e e'*. During the rotation of the piston-disk both the gas and water are permitted to flow into their respective pockets, the water being discharged through the valve-controlled port 9 into the water-chamber 10, whence it is discharged through the overflow-nozzle 31 at the base of the rear of said chamber, (see Fig. 5,) it being understood that the object of the water is to cool the several parts.

I do not, of course, limit myself to the precise details herein shown and described, for various changes might be made without departing from the spirit of my invention.

Having described my invention, what I claim is—

1. In a rotary engine, a rotatable piston-disk, pockets formed along one face thereof and disposed along arcs of a series of concentric circles, a series of said pockets gradually tapering at one end, and having an abrupt or plane wall at the opposite end, a face-plate having a series of ports located in position to come opposite said pockets, and valves controlling said ports, and adapted to bear against the walls of the pockets during the rotation of the piston-disk, substantially as set forth.

2. In a rotary engine, a rotatable piston-disk having a plane inner face, pockets formed on said face and disposed along arcs of a series of concentric circles, a series of said pockets having each an abrupt or plane terminal wall at one end, a face-plate adjacent to said piston-disk, a series of ports disposed along the face-plate in position to come opposite said pockets, and valves controlling said ports and adapted to bear against the walls of the pockets during the rotation of the disk, substantially as set forth.

3. In a rotary engine, a stationary face-plate having a gas-inlet opening, a valve-controlled port located at the same radial distance from the center thereof, a gas-chamber located to the rear of the plate and communicating with the said port, an outlet-valve from said chamber located along the front face of the plate at a greater radial distance than the port aforesaid, an exhaust-valve located at a point diametrically opposite the outlet-valve and at the same radial distance therewith from the center of the plate, a rotatable piston-disk having pockets formed along the inner face thereof and distributed in the path of the respective ports and valves of the face-plate, means for exploding the gas mixture in the gas-chamber at the proper moment, during the rotation of the piston-disk, means for opening and forcing the valves open and against the walls of the pockets in the course of rotation of the piston-disk, the valves being forced to a closed position by the inner face of the disk after the pocket has passed any valve, the parts operating substantially as and for the purpose set forth.

4. In a rotary engine, a piston-disk having a series of pockets disposed along arcs of concentric circles, and oil-grooves located between the ends of the various pockets, and disposed from the center, outwardly, a face-plate, suitable valves on said plate coöperating with said pockets of the piston-disk, and oil-supply openings coöperating with the oil-grooves, substantially as set forth.

5. In a rotary engine, a stationary face-plate having a series of valves disposed in the path of arcs of concentric circles, a gas-inlet opening formed in the plate in the path of the circle of the gas-valve, a conduit leading

from said opening at the back of the face-plate, a water-inlet opening formed in the plate in the path of the circles of the water-valve, a conduit leading from said opening at the back of the face-plate, a gas-explosive chamber communicating with the port controlled by the gas-valve, and located at the back of the face-plate, a valve for permitting the discharge of the exploded mixture located along the front face of the face-plate, exterior to the gas-valve, an exhaust-valve located diametrically opposite the gas-chamber discharge-valve, but disposed radially the same distance therewith, an exhaust-nozzle communicating with the port of the exhaust-valve on the back of the face-plate, an oil-conduit located in the back of the face-plate and communicating with the front face thereof through a series of openings formed in the face-plate, a tubular shaft-bearing projecting from the center of the face-plate rearwardly, a piston-disk rotating against the front of the face-plate and having pockets contiguous thereto and in the path of the several openings and valves, a shaft passing through the tubular bearing of the face-plate and secured to the piston-disk, and means carried by the latter for exploding the gas within the gas-explosive chamber the latter being provided with electrodes to produce electric discharges, substantially as set forth.

6. In a rotary engine, having a piston-disk, a series of pockets formed along one face thereof, a series of said pockets gradually tapering at one end, and having an abrupt or plane wall at the opposite end and a face-plate having a series of valve-controlled ports coöperating with said pockets, substantially as set forth.

7. In a rotary engine, a face-plate, a valve hinged along the front face thereof, a tubular casing adjacent to the hinge-line, a plunger mounted in the casing and adapted to bear against the valve, an outer terminal screw-plug, a spring interposed between said plug and plunger, and a port formed in the face-plate in position to be controlled by said valve, substantially as set forth.

8. In a rotary engine, a face-plate, a ledge or wall surrounding the same, a cover-plate secured to said wall whereby a water-chamber is formed between said cover-plate and face-plate, tubular outwardly-screw-threaded valve-casings and a tubular shaft-bearing or hub projecting from the rear of the face-plate, the cover-plate having openings adapted to pass over said tubular casings and hub, a nut and washer passed over the screw-threaded portion of each casing and adapted to form a water-tight joint with the cover-plate, the latter being provided with an overflow nozzle or pipe, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN STRASZER.

Witnesses:

EMIL STAREK,

JAMES J. O'DONOHOE.