No. 889,477. PATENTED JUNE 2, 1908.

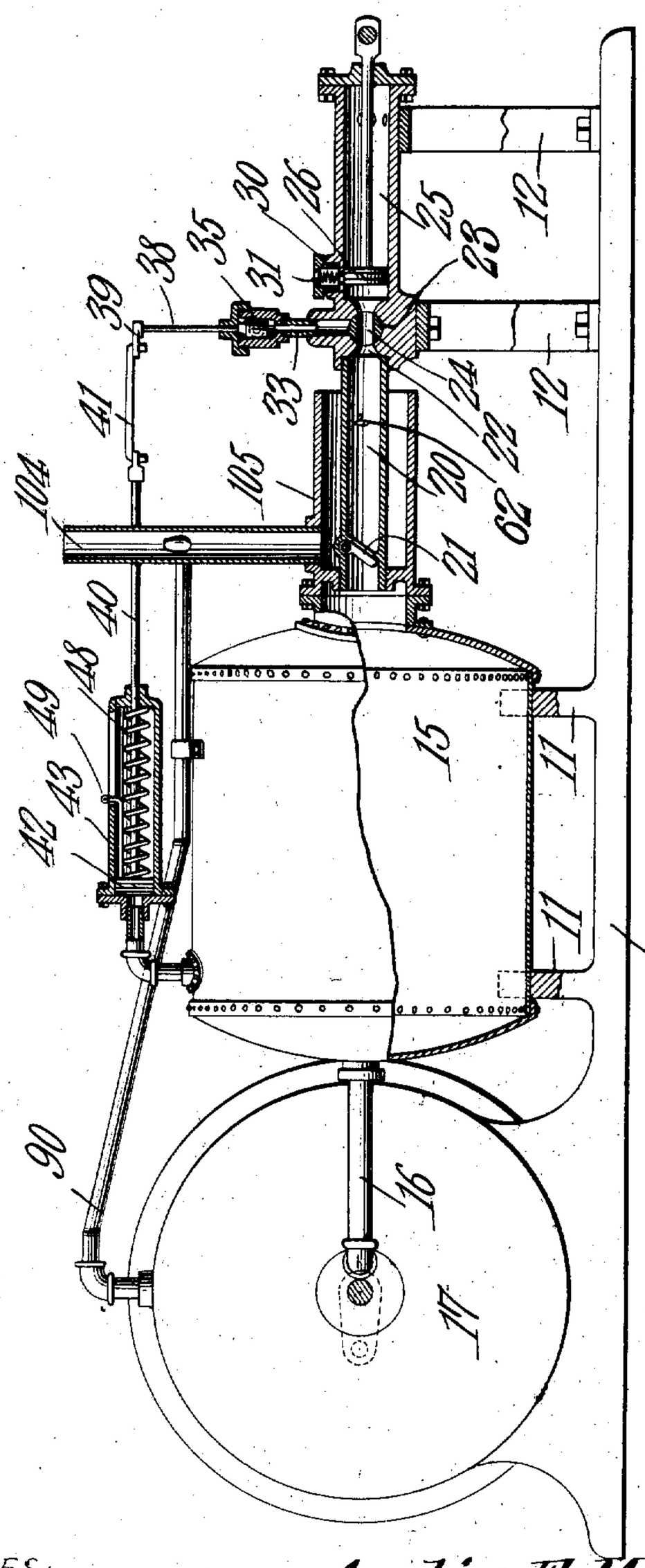
A. E. MILLER.

MOTOR MECHANISM.

APPLICATION FILED MAY 27, 1907.

2 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:

E. F. Stewart

Jno. E. Parker

Austin E. Miller, INVENTOR.

By C. A. Snow & Co.

ATTORNEYS

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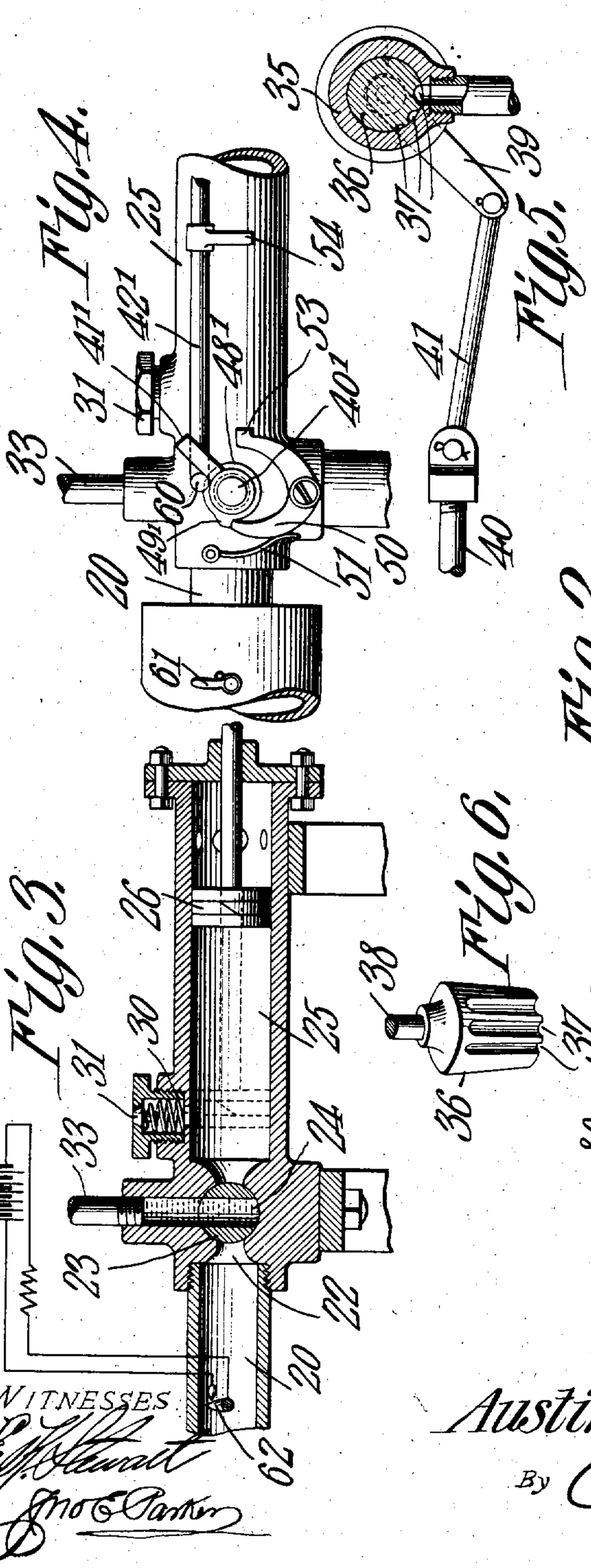

Fig. 4.

Fig. 5.

Fig. 3.

Fig. 6.

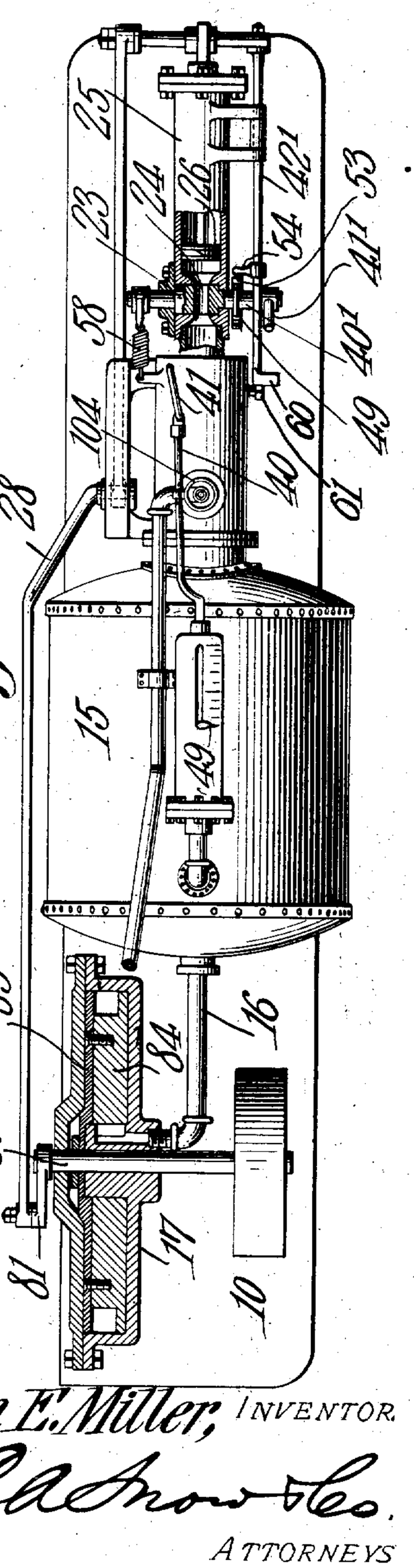

Fig. 2.

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UNITED STATES PATENT OFFICE.

AUSTIN E. MILLER, OF CHENEY, WASHINGTON.

MOTOR MECHANISM.

No. 889,477. Specification of Letters Patent. Patented June 2, 1908.

Application filed May 27, 1907. Serial No. 376,037.

To all whom it may concern:

Be it known that I, AUSTIN E. MILLER, a citizen of the United States, residing at Cheney, in the county of Spokane and State of Washington, have invented a new and useful Motor Mechanism, of which the following is a specification.

This invention relates to apparatus for the utilization of gases under pressure in the operation of motors, and has for its principal object to provide an improved means, whereby a fluid under pressure may be stored from the explosion of gases and subsequently utilized in the operation of a rotary engine or other motor element.

A further object of the invention is to provide a device of this class in which the successive charges of explosive compound are forced to the exploding compartment or cylinder by the driven motor, and to provide means whereby the quantity of such charges is controlled by the degree of pressure of the gases stored for motor purposes.

A further object of the invention is to provide a novel cooling arrangement, whereby the exhausted gases serve as a means for inducing the flow of a current of cool air around the explosion chamber.

A still further object of the invention is to provide a novel form of motor of a construction best adapted for utilizing the gases for power purposes.

With these and other objects in view, as will more fully hereinafter appear, the invention consists in certain novel features of construction and arrangement of parts, hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings:—Figure 1 is a longitudinal sectional elevation of a motor mechanism constructed and arranged in accordance with the invention. Fig. 2 is a plan view of the same partly in section. Fig. 3 is a detail sectional view of the pumping and compressing cylinder and a portion of the explosion chamber. Fig. 4 is a side elevation of the same. Fig. 5 is a sectional plan view of the pressure controlled valve for regulating the quantity of liquid fuel admitted at each charge. Fig. 6 is a detail perspective view of the valve detached.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

The various working parts of the apparatus are mounted on a suitable frame including a bed or sole plate 10 and vertical standards 11—12. Near one end of the frame is a storage reservoir 15 which may be of any desired size, and one end of which is connected by a pipe 16 to the motor member 17, the latter being in the form of a rotary engine. Arranged at one end of the storage reservoir 15 is an explosion chamber 20 in which gases or other explosive compounds are consumed, or partly consumed, and the resultant products of combustion under high pressure pass into the reservoir 15, and are held from backward flow into the explosion chamber by means of a suitable check valve 21. Leading from the end of the explosion chamber is an inlet tube 22, in which is arranged a valve 23 having a port 24 extending diametrically across the valve and movable to positions into and out of alinement with the inlet passage. At the opposite side of the valve casing is a pump cylinder 25 in which is arranged a plunger 26, said plunger being connected to the motor member 17 by means of a rod 28 in the manner hereinafter described, so that each time the motor is revolved, the plunger will be reciprocated within the cylinder.

Near the valve casing 23 is arranged an inlet port 30 leading to the cylinder 25, this port being normally closed by a spring actuated valve 31, said valve being opened by the partial vacuum created within the cylinder during the out stroke of the plunger, and being closed and retained in closed position as the plunger moves forward in forcing the air from the pump cylinder through the port 24 and passage 22 to the explosion chamber.

To the top of the valve casing 23 is connected a liquid fuel supply pipe 33 which may be connected to a suitable reservoir or other source of supply, and in this tube 33 is arranged a casing 35 containing a valve 36 that is provided with a number of tapered ports 37 any one of which may be brought into proper position to control the flow of the liquid fuel through the pipe, these ports being of different area and permitting the passage of different quantities of fuel.

To the top of the valve 36 is connected a

stem 38 from which projects an arm 39, and this arm is connected to a rod 40 by means of a link 41. The rod 40 is connected to a plunger 42 arranged within a cylinder 43 that communicates with the storage reservoir 15, and the end of the plunger is constantly exposed to the pressure of fluid in the reservoir. Around the rod 40 is coiled a spring 48 that tends normally to force the plunger or piston inward against the pressure of the gases. Projecting from the plunger is a pointer 49 that extends through a suitable slot formed in the cylinder 43 and may move over graduations for the purpose of indicating the pressure in the reservoir.

When the pressure is abnormally high, the plunger 42 is moved outward, and this movement is transmitted through the previously described connections to the valve 36, turning the latter to present a port of smaller area into feed position, and the greater the pressure, the smaller the port, or if the pressure is exceedingly high, the valve may be moved to closed position. In this manner the quality of the explosive compound is governed in accordance with the degree of pressure contained within the reservoir.

Projecting from one end of the valve 24 is a stem 40′ carrying an arm 41′ which may be connected by a rod 42′ to the stem of plunger 26, and mounted also on the stem 40′ is a detent disk 48′ having a tooth 49′ that is arranged to be engaged by a pawl 50 pivoted on the frame and moved by a spring 51 in the direction of the disk, so that the pawl will move into engagement with the tooth 49. When, therefore, the plunger 26 is moved outward, the movement is transmitted through the connections to the valve 24, and the latter will be turned until its port is in vertical position in alinement with the oil feed pipe 33 and the port will be filled with oil, gasolene or the like. Connected to the pawl 50 is an arm 53 that is arranged in the path of movement of a lug 54 projecting from the face of the rod 42′, and when the plunger has nearly completed its stroke, the lug 42′ will engage the arm 53 and will move the pawl from engagement with the tooth 49′ in order to permit the return of the valve 23 to such position as to place its port in communication with the pump cylinder, and the passage way 22. To accomplish this latter movement the stem of the valve is connected at one end to a spring 58, said spring being suitably secured to a fixed point and being placed under stress during the outward movement of the plunger, so that as soon as the pawl 50 is released, the spring is free to contract and move the valve 23 to a position to effect discharge of the contents of the port into the explosion chamber.

During the in stroke of the plunger 26 the air previously drawn into the cylinder is compressed, and during the latter portion of the stroke, the valve is moved to the open position, so that the compressed air striking the hydro-carbon will force the latter through into the explosion chamber and form an explosive compound which is ignited after passing into said chamber. The ignition is accomplished at the proper time by the engagement of the end of arm 60 of the rod 42′ with the movable arm 61 of a sparking plug 62 so that the circuit will be broken for the purpose of creating a spark and firing the charge. This charge instantly passes beyond the valve 21 into the storage reservoir. At suitable points on the frame are bearings for the support of a shaft 80 that is provided with a crank 81 connected by rod 28 to the plunger 26.

The exhaust gases pass through the pipe 90 to a vertically disposed flue 104 that extends upward from a casing 105 surrounding the explosion chamber, and as this flue is heated by the exhaust gases, an upward draft is created which will draw in the cool outer air, so that a circulation may be maintained around the explosion chamber, for the purpose of preventing overheating of the latter.

It is found in practice that the fuel may be utilized more economically by first exploding and storing the pressure in a reservoir and afterwards utilizing this pressure in the operation of the rotary engine, than is possible where the explosions occur directly in the working space of the engine, owing to the fact that in the latter case the operation is intermittent and exerts considerable strain on the working parts, while the use of a continuous volume of gas of practically uniform pressure permits smooth running of the engine at uniform speed.

I claim:—

1. In mechanism of the class described, a reservoir for storing gases under pressure, an explosion chamber in communication therewith, an air compressing cylinder, a plunger therein, a motor having an inlet port connected to the reservoir, means for operatively connecting the motor to the plunger, and a liquid fuel measuring means controlling communication between the pumping cylinder and the explosion chamber.

2. In combination, an explosion chamber, a pump for compressing and forcing air thereinto, a ported valve controlling communication between the compressor and the explosion chamber, means for supplying liquid fuel to the port of said valve when the latter is in a position to shut off communication between the pumping means and the explosion chamber, and means for moving the valve to open position as the pump nears the limit of its compression stroke.

3. In combination, an explosion chamber, an air pumping means, a ported valve between the two, the port of said valve forming a fuel feeding chamber, and means for mov-

ing the valve to open position as the pump nears the limit of its compression movement.

4. In combination, an explosion chamber, an air pumping and compressing means, a valve between the two, said valve having a port for delivering a measured quantity of liquid fuel to the explosion chamber, and means for turning said port to open and close communication between the pumping means and the explosion chamber, and means for moving the valve to open position as the pump nears the limit of its compression movement.

5. In combination, an explosion chamber having an entrance port at one end, means for compressing a charge of air and directing the same through the port, means for delivering into the port a measured charge of liquid fuel to be carried with the air into the explosion chamber, and means for placing said port in communication with the explosion chamber as the compressing means nears the limit of its compression movement.

6. In combination, an explosion chamber having an inlet port, an air compressing means communicating with said inlet port, a valve for closing the port, said valve when in closed position forming one wall of the air compressing chamber, the valve having a port constituting a liquid fuel measuring chamber, and means for moving the valve to present the valve port into alinement with the inlet port when the charge of air has been compressed.

7. In combination, an explosion chamber, an air compressing cylinder, a plunger therein, a motor member operated by the gases generated from the explosion, means for connecting said motor to the plunger, a valve controlling communication between the pumping cylinder and the explosion chamber and forming when in closed position a wall of the compression cylinder, said valve having a port constituting a liquid fuel measuring chamber, means for feeding liquid fuel thereto, and means under the control of the motor for moving said valve to open and closed positions.

8. In combination, an explosion chamber, an air compressing cylinder, a valve controlling communication between the two, a plunger disposed in the cylinder, a motor operable by the gases generated from the explosion, means for operatively connecting the motor to the plunger, the valve having a port constituting a liquid fuel measuring chamber, means for supplying liquid fuel thereto, means for opening the valve to the liquid fuel supply during the out or idle stroke of the plunger, and means for operating the valve to close communication with the fuel supply and open communication between the cylinder and the chamber during the latter portion of the stroke of the plunger.

9. In combination, an explosion chamber, an air compressing cylinder, a valve controlling communication between the two, said valve having a port constituting a liquid fuel measuring chamber, means for feeding liquid fuel thereto, a motor operable by the gases generated from the explosions, a plunger disposed in the cylinder and operatively connected to the motor, a stem carrying the valve, a detent disk on said stem, a pawl engaging said detent disk, means movable with the plunger for turning the stem during the out stroke of said plunger to place the valve port in communication with the liquid fuel supply, and means operable toward the completion of the compression movement of the plunger for releasing said detent and permitting movement of the valve to open position with its port in communication with the explosion and explosion chamber.

10. In combination, an explosion chamber, an air compressing cylinder, a valve controlling communication between the two said valve having a port forming a liquid measuring chamber, means for supplying liquid fuel thereto, a motor operable by the gases generated from the explosion, a plunger disposed in the cylinder and operatively connected to the motor, a stem on the valve, means operating with the plunger for moving the stem in one direction, means for locking said stem, means for releasing the stem, a spring tending to restore the stem and valve to initial position after release, a spark plug, and a circuit closer operating with said stem to control the circuit of the spark plug.

11. In apparatus of the class described, the combination with an explosion chamber, of a fuel feed pipe, a valve arranged therein, a storage reservoir in communication with the explosion chamber, and means controllable by the variation of pressure in said reservoir for governing the extent of opening movement of the valve and the quantity of fuel fed to said explosion chamber.

12. In apparatus of the class described, the combination with a storage reservoir, of an explosion chamber connected therewith, a liquid fuel supply pipe, a valve arranged therein and provided with a plurality of ports of different size, respectively, a cylinder in communication with the reservoir, a spring actuated plunger in said cylinder, and means connecting said plunger to the valve to thereby vary the quantity of fuel passing to the explosion chamber in accordance with the pressure in the reservoir.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

AUSTIN E. MILLER.

Witnesses:
C. W. DAVIS,
R. L. DUDLEY.