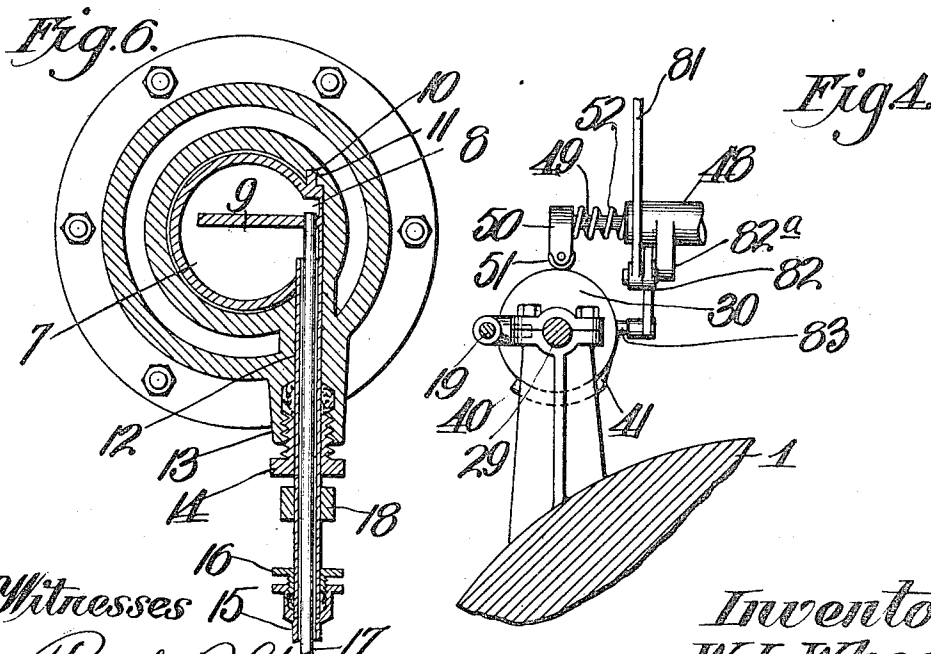
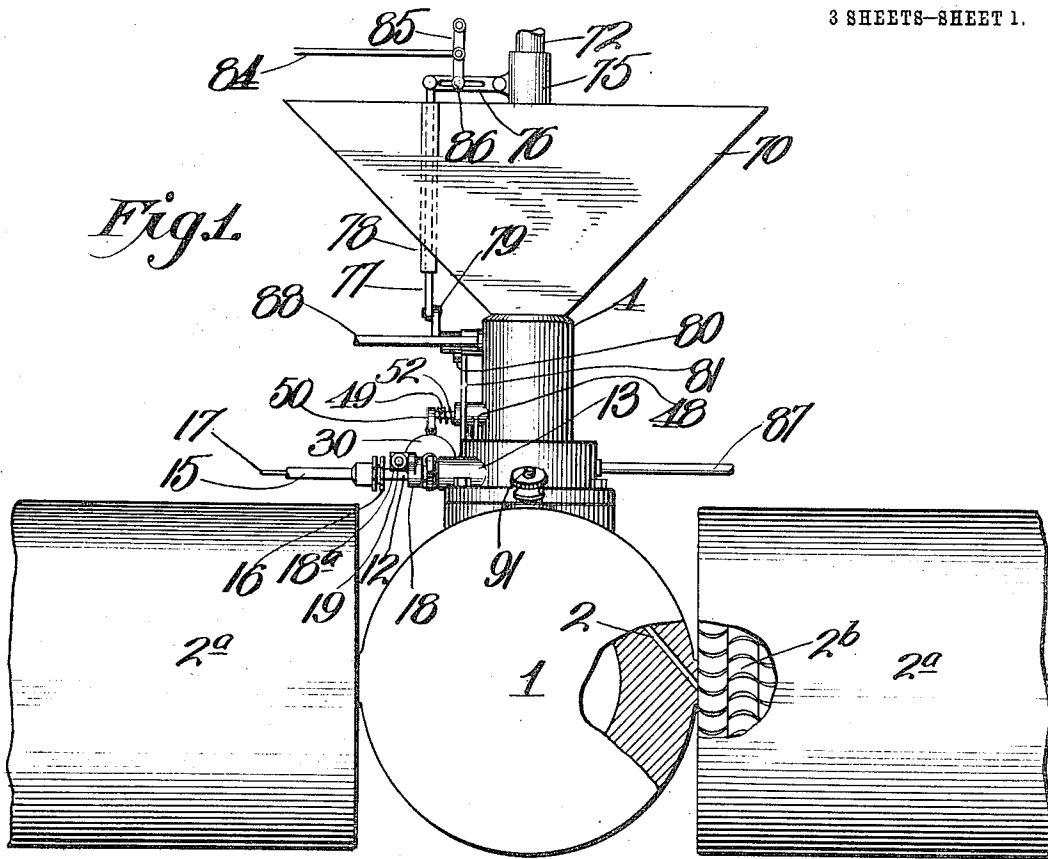


W. L. WHEELER.
INTERNAL COMBUSTION TURBINE ENGINE.
APPLICATION FILED OCT. 3, 1911.

1,059,509.

Patented Apr. 22, 1913.

3 SHEETS—SHEET 1.



Witnesses
Frank R. Glou
A. C. Rodgers

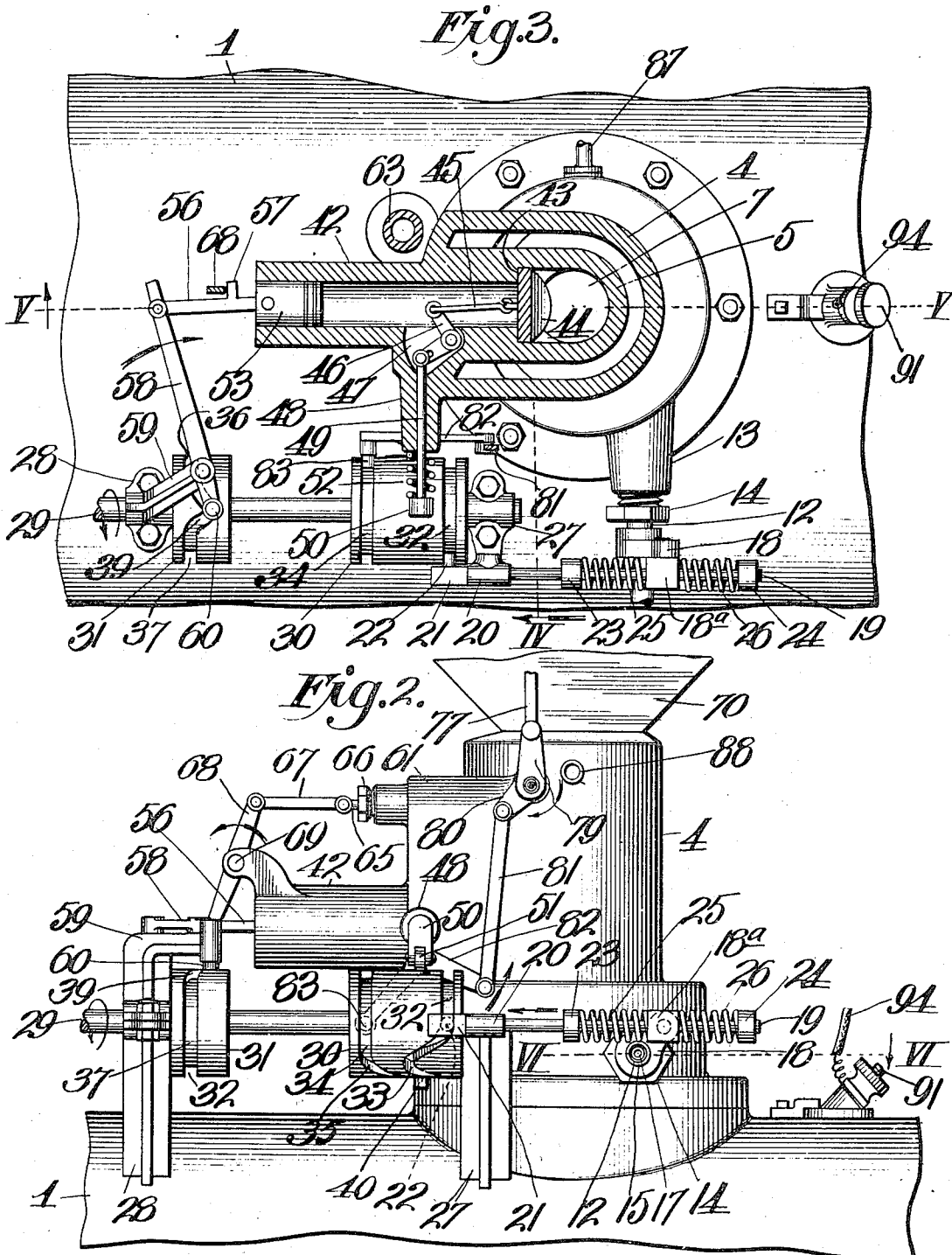
Inventor
W. L. Wheeler
By George Y. Thorpe Atty.

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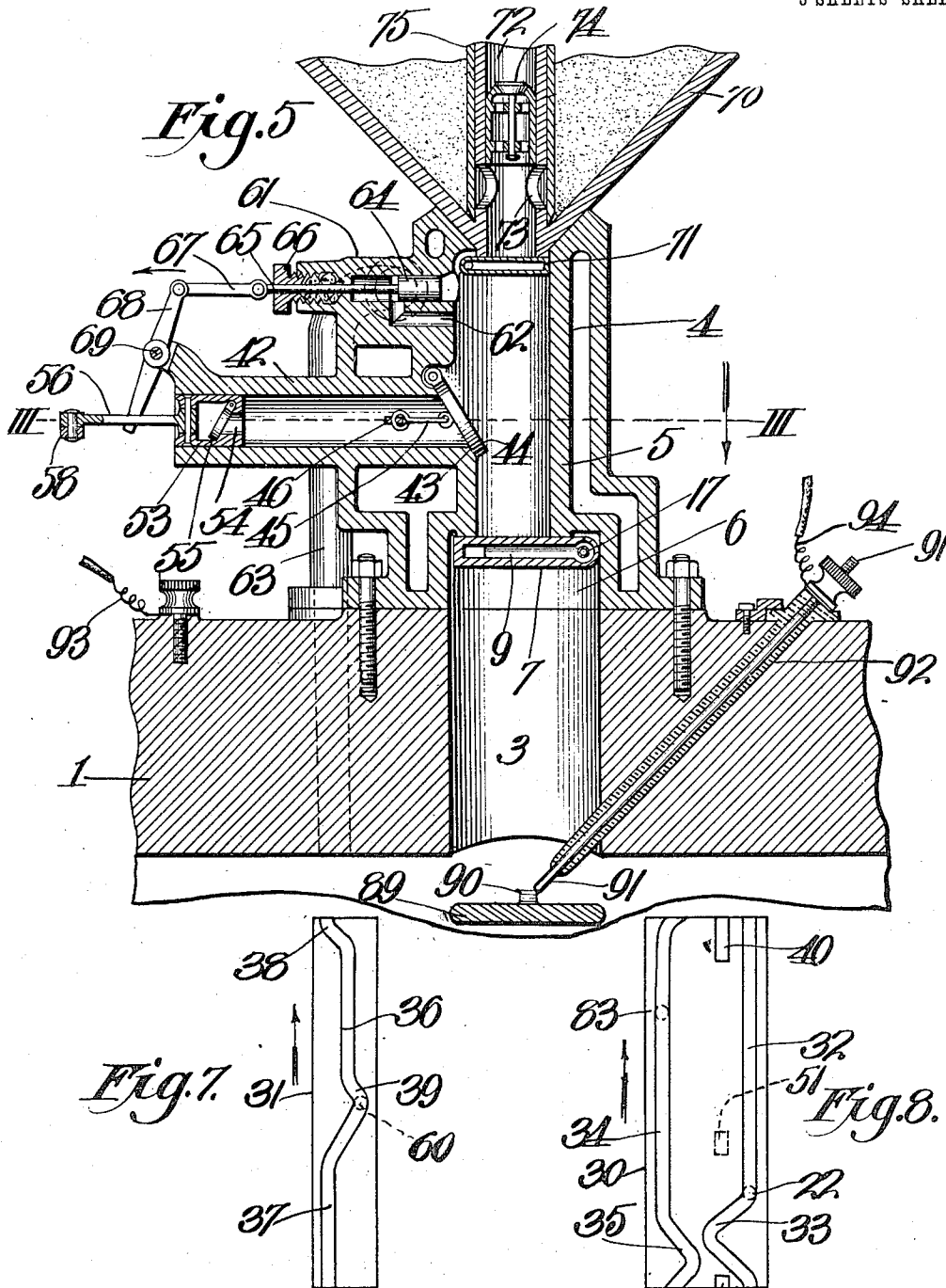
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UNITED STATES PATENT OFFICE.

WILLIAM L. WHEELER, OF MONTGOMERY, MISSOURI.

INTERNAL-COMBUSTION TURBINE-ENGINE.

1,059,509.

Specification of Letters Patent.

Patented Apr. 22, 1913.

Application filed October 3, 1911. Serial No. 652,500.

To all whom it may concern:

Be it known that I, WILLIAM L. WHEELER, a citizen of the United States, residing at Montgomery, in the county of Montgomery and State of Missouri, have invented certain new and useful Improvements in Internal-Combustion Turbine-Engines, of which the following is a specification.

This invention relates to internal combustion turbine engines, and has for its object to produce an efficient engine of this character in which powder or other explosive may be exploded to produce the force for driving the engine.

With this general object in view and others as hereinafter appear, the invention consists in certain novel and peculiar features of construction and organization as hereinafter described and claimed; and in order that it may be fully understood reference is to be had to the accompanying drawings, in which—

Figure 1, is an end view of a turbine engine embodying my invention. Fig. 2, is an enlarged fragmentary side view of the engine. Fig. 3, is a horizontal section on the line III—III of Fig. 5. Fig. 4, is a vertical section on the line IV of Fig. 3. Fig. 5, is a vertical section on the line V—V of Fig. 3. Fig. 6, is a horizontal section on the line VI—VI of Fig. 2. Figs. 7 and 8 are diagrammatic views of a pair of cam wheels forming parts of the engine, as though the circumferential portions were straightened out; said figures indicating in dotted lines the relative positions of the parts acted upon by said cam wheels in the order or sequence in which said parts are moved.

In the said drawings, where like reference characters identify corresponding parts in all the figures, 1 indicates what may be termed the cylinder of the engine and 2, one of the ports thereof through which the gas produced by the explosion passes to operate the wheels 2^a of the engine, 2^b indicating vanes of the said wheels upon which the gas from ports 2 impinges in a well known manner.

The cylinder is provided with a passage 3 through which the gas enters, and bolted or otherwise secured upon the cylinder is a water-jacketed receiver 4, the inner wall 5 of which is enlarged at its lower end at 6, where it communicates with passage 3, and arranged in said enlargement 6 is a hollow valve 7, which when closed seats against the

bottom of the wall 5, of the receiver as shown clearly in Fig. 5. The valve 7 is provided with a hollow hinge arm 8 and with a partition 9, which extends from one end of the hinge arm nearly across the body of the valve as shown in Fig. 6. The hinge arm is provided with a pivot or trunnion 10 at one side for engagement with a socket 11 in the receiver, and at its opposite side the arm is provided with a tubular trunnion 12 which is journaled in the receiver and extends through a boss 13 thereof and a stuffing box 14 mounted in the end of said boss.

At its outer end the tubular trunnion 12 communicates with a stationary supply pipe 15, a packing gland 16 being utilized to establish a water tight joint between said pipe and said tubular trunnion. To conduct water from the valve, a small pipe 17 extends through pipe 15 and trunnion 12 and into the hollow valve and communicates with the latter at the opposite side of its partition from the trunnion 12, this arrangement insuring a proper circulation of water through the valve to prevent the latter from becoming unduly heated.

18 is a crank arm secured on trunnion 12, and pivoted to said arm is a perforated block 18^a through which slidably extends a rod 19, which also extends slidably through a guide sleeve 20, and is provided at one end with a head 21, and a laterally projecting pin 22. At opposite sides of the block 18^a, collars 23 and 24 are secured on the rod, and interposed between said collars and the block 18^a, are springs 25 and 26 respectively, said springs tending to hold the valve in its closed position and to constitute cushions for the opening and closing movements of the valve.

27 is a standard preferably cast with the cylinder and with guide 20, and 28 is a second standard and journaled in said standards is a driven shaft 29 equipped between the standards with a pair of cam wheels 30 and 31, the former having a cam groove 32 provided with a V-shaped cam portion 33, and a cam groove 34 having a V-shaped cam portion 35 which is disposed reversely with respect to portion 33, it being also noted by reference to Figs. 2 and 8 that the apex of the V-shaped portion 35 is slightly rearward of the apex of the V-shaped portion 33 with respect to the direction of rotation of the driven shaft 29, which is as indicated by the arrow Fig. 2.

The cam wheel 31 is provided with a cam groove which consists of two straight portions 36 and 37 and two oppositely bowed or cam portions 38 and 39, and the relative positions of the cam portions of the grooves of the cam wheels is indicated most clearly in the diagrammatic Figs. 7 and 8. The cam wheel 30 is also provided with a peripheral lug 40 beveled at its rear end at 41.

The receiver is provided with a tubular arm 42 formed at its inner end with an inclined valve seat 43 for engagement by a hinged valve 44 pivotally connected by a link 45 to a bell crank 46 arranged in a recess 47 of the wall of said tubular arm, and pivoted to said bell crank and extending slidingly through a boss 48 of the receiver, is a slide rod 49, provided at its outer end with a head 50, equipped with an anti-friction roller 51, standing normally in the path of rotation of the lug 40, under the pressure of a spring 52 interposed between the said head and the boss 48. Fitting reciprocally in tubular arm 42 is a tubular piston 53 whose passage 54 is normally closed by an internal check valve 55. 56 is a piston rod pivoted to the piston for movement in a horizontal plane and provided with a laterally projecting arm 57, and said piston is pivoted to a lever 58, pivoted near one end to an extension 59 of bracket 28, and near its last-named end the lever is provided with a depending pin 60, engaging the groove of cam wheel 31, the arrangement being such that the rotation of said wheel shall impart reciprocatory movement to the piston in the tubular arm 42.

Vertically above tubular arm 42, the receiver is provided with a hollow offsetting portion 61, which is connected about midway its length by a by-pass 62 to the chamber of the receiver, and by a pipe 63 to the interior of the cylinder 1, and fitting slidingly in said portion 61 and adapted to alternately close and open communication between the said portion and by-pass 62 and pipe 63 is a piston 64, having a stem 65 extending through a stuffing box 66, and connected pivotally by a link 67 with a rock lever 68, pivoted at 69 to tubular arm 42, and arranged with its free end in the path of outward movement of lug 57, of rod 56, and in the path of inward movement of the adjacent end of lever 58, as shown most clearly in Fig. 3.

Secured in and closing the upper end of the receiver is a holder 70, closed normally by a hinged valve 71, which valve is preferably hollow as shown (see Fig. 5), for water cooling purposes, the valve corresponding in construction preferably to valve 7 and being adapted to be equipped with means, not shown, for circulating water through it of the same general type as shown and described in connection with valve 7.

The holder is provided with a central tube 72 having inlet opening 73, and arranged in said tube is a gravity valve 74 adapted to yield and open in the event an explosion occurs when valve 71 is open. Fitting slidingly and with an air-tight relation on tube 72 is a sleeve valve 75, the same when in normal position closing the openings 73 to prevent powder in the holder from entering tube 72. To the upper end of sleeve valve 75 is pivoted a slotted arm 76, pivotally connected by rod 77 extending downward through a tube 78, secured to the holder, to a crank arm 79, secured to one of the trunnions of valve 71.

80 is a second crank for said trunnions of valve 71 connected by a link 81 to one arm of a bell crank lever 82 fulcrumed on an arm 82^a depending from boss 48. Said bell crank lever is also provided at its opposite end with a pin 83 engaging groove 34 of cam 30.

84 is a rod leading from any suitable governor (not shown) to a lever 85, suitably supported above the holder and said arm is provided with a fulcrum pin 86 fitting in the slot of arm 76.

The space between the inner and outer walls of the receiver is for the reception and circulation of water supplied to the receiver by pipe 87, a pipe 88 conducting the water from the receiver.

For producing a spark to ignite a charge of powder as it falls through passage 3 into the cylinder as hereinafter explained, I provide an ignition mechanism consisting of a shelf 89 supported by one or more laterally projecting arms 90, extending crosswise of the cylinder and a pin 91 extending into the cylinder through a porcelain or other insulating tube 92, the wires 93 and 94 forming part of the ignition mechanism circuit, being connected respectively to the engine and said pin, as shown in Fig. 5, or in any other suitable manner.

Assuming that shaft 29 is rotating in the direction indicated by the adjacent arrows, Figs. 2 and 3, and that a charge of powder is resting upon the water-cooled valve 7, it will be seen that pin 60 is in engagement with the apex of portion 39 of the groove of cam wheel 31, and that pin 22 is in engagement with the front extremity of cam groove portion 33 of cam wheel 30, and that pin 83 occupies the straight groove portion 37 of cam groove 34 of said wheel. It will also be noticed that when pin 60 is in the position explained, the piston 53 is at the limit of its outward movement and that because of this fact, arm 57 of the piston rod 56 through rock lever 68, is holding piston 64 in such position that communication is uninterrupted between the interior of the cylinder and receiver by way of pipe 63, tubular portion 61 of the re-

ceiver and the by-pass 62, and that pressure from explosions which have occurred in the cylinder is in the receiver so that when valve 7 is opened there shall be no inrush of pressure into the receiver from the cylinder which would interfere with the proper fall of the powder in a compact mass, down upon the shelf 89, as hereinafter explained. It will be further noted that because of the position of pin 22, the hollow valve 7 is held with a yielding pressure by spring 25.

The following operations in the order named occur through the rotation of shaft 29: Lever 58 is operated its full distance in the direction indicated by the adjacent arrow, Fig. 3, and the piston 53 is moved inward for the full length of its travel. The free end of said lever in the latter part of its said movement, engages the lower end of lever 68 and rocks the same in the direction indicated by the adjacent arrow, Fig. 5, so as to move piston 64 outward and close communication between the interior of the cylinder and the interior of the receiver, by way of pipe 63 and by-pass 62. At the same time the cam portion 33 imparts opening movement to valve 7 by moving rod 19 to the left and causing spring 26 to press upon block 18^a and the charge of powder on the said valve drops down upon shelf 89. Immediately after this occurs the cam portion 33 reverses the movement of rod 19 and closes said valve 7, this action being instantly followed by the production of a spark by the ignition mechanism and the explosion of the charge, and under the pressure developed by this explosion, the speed of rotation of the turbine wheels is maintained. The actions described occur while the shaft is describing a quarter revolution, and at the completion of the next quarter revolution the lug 40 of cam wheel 30, engages antifriction wheel 51 (see Figs. 2 and 4) and forces the spring-advanced rod 49 inward and thereby causes bell crank 46 to open valve 44 through connecting rod 45. This results in the scavenging of the receiver, as the pressure therein opens check valve 55 and escapes through the opposite end of piston 53 and arm 42 to the atmosphere. As the shaft completes a half revolution and before valve 44 is permitted to close under the pressure of spring 52, the pin 60 is engaged by cam groove portion 38 of cam 31, thereby causing piston 53 to move outward in excess of half its travel, this movement of the piston creating a partial vacuum in the receiver. Immediately after the partial vacuum is created in the receiver, lug 40 passes from engagement with the antifriction roller 51 and spring 52 closes valve 44, the shaft 29, having, by this time, made about three-fourths of a revolution. Immediately following the closure of valve 44, pin 83 is engaged by the cam portion 35

of groove 34 and as a result the bell crank lever 82 is rocked in the direction indicated by the adjacent arrow, Fig. 2, and through link 81 turns crank arms 79 and 80 in the direction indicated by the arrow adjacent thereto, Fig. 2. The turning of said crank arms results in the opening of valve 71, and the upward movement of sleeve valve 75, the distance which the latter moves upward being determined by the position of the governor controlled fulcrum lever 85, as will be readily understood by reference to Fig. 1, that is to say, if the engine is running too fast the fulcrum lever will be swung inward and hence prevent sleeve 75 moving upward its full distance and thus diminish the quantity of powder that is permitted to pass from the holder through opening 73 into the receiver and upon valve 7, the reverse of this statement being true if the engine is running too slowly as will be readily understood, and in this connection it will be seen that the partial vacuum in the receiver, produces a suction whereby the powder is positively drawn from the holder into the receiver, the valves 75 and 71 then closing under the action of the return cam portion of cam groove 35. After said valves are closed and just prior to the completion of the revolution of shaft 29, the pin 60 is again engaged by the cam portion 39 of wheel 31, and the lever 58 is caused to move piston 53 outward to its initial position and the arm 57 of piston rod 56, operates lever 68 and thereby moves piston 64 inward to reestablish communication between the cylinder and the receiver, all following actions being repetitions of those described.

In the event of a premature explosion occurring when valve 71 is opened through the contact of the explosive charge with highly heated carbon which may have accumulated to some extent on valve 7, the valve 74 opens under the force of the expanding gas and permits the same to pass upward through tube 74 to the atmosphere, the valve 7, if the same also opens under such force, being immediately reclosed by the pressure of spring 25.

From the above description it will be apparent that I have produced an internal combustion turbine engine embodying the features of advantage enumerated as desirable, and I wish it to be understood that while I have illustrated and described the preferred embodiment of the invention, I do not desire to be restricted to the exact details of construction shown and described as obvious modifications will suggest themselves to one skilled in the art.

I claim:—

1. An internal combustion engine, comprising an explosive holder, a tube therein, a yieldingly-closed valve in said tube, a valve controlling communication between the

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tube and holder, a receiver, a valve controlling admission of the explosive to the receiver from the said tube, a cylinder having a discharge passage, a valve controlling communication between the receiver and cylinder, means whereby the valves controlling communication between the holder and the tube and tube and receiver shall be opened and closed to effect the passage of a charge of explosive from the holder into the receiver, and yielding means holding the valve controlling communication between the receiver and cylinder in closed position.

2. An internal combustion engine, comprising an explosive holder, a tube therein, a yielding-closed valve in said tube, a valve controlling communication between the tube and holder, a receiver, a valve controlling admission of the explosive to the receiver from the said tube, a cylinder having a discharge passage, a valve controlling communication between the receiver and cylinder, means whereby the valves controlling communication between the holder and the tube and tube and receiver shall be opened and closed to effect the passage of a charge of explosive from the holder into the receiver, and means for opening and closing the valve controlling communication between the receiver and cylinder.

3. An internal combustion engine, comprising an explosive holder, a tube therein, a yielding-closed valve in said tube, a valve controlling communication between the tube and holder, a receiver, a valve controlling admission of the explosive to the receiver from the said tube, a cylinder having a discharge passage, a valve controlling communication between the receiver and cylinder, means whereby the valves controlling communication between the holder and the tube and tube and receiver shall be opened and closed to effect the passage of a charge of explosive from the holder into the receiver, means for opening and closing the valve controlling communication between the receiver and cylinder, and means to effect the explosion of the charge within the cylinder.

4. An internal combustion engine, comprising an explosive holder, a tube therein, a yielding-closed valve in said tube, a valve controlling communication between the tube and holder, a receiver, a valve controlling admission of the explosive to the receiver from the said tube, a cylinder having a discharge passage, a valve controlling communication between the receiver and cylinder, means whereby the valves controlling communication between the holder and the tube and tube and receiver shall be opened and closed to effect the passage of a charge of explosive from the holder into the receiver, means for opening and closing the valve controlling communication between

the receiver and cylinder, means to effect the explosion of the charge within the cylinder, and connections whereby pressure developed by the explosion within the cylinder, shall be admitted to the receiver.

5. An internal combustion engine, comprising an explosive holder, a tube therein, a yielding-closed valve in said tube, a valve controlling communication between the tube and holder, a receiver, a valve controlling admission of the explosive to the receiver from the said tube, a cylinder having a discharge passage, a valve controlling communication between the receiver and cylinder, means whereby the valves controlling communication between the holder and the tube and tube and receiver shall be opened and closed to effect the passage of a charge of explosive from the holder into the receiver, means for opening and closing the valve controlling communication between the receiver and cylinder, means to effect the explosion of the charge within the cylinder, connections whereby pressure developed by the explosion within the cylinder shall be admitted to the receiver, and means for closing such connections.

6. An internal combustion engine, comprising an explosive holder, a tube therein, a yielding-closed valve in said tube, a valve controlling communication between the tube and holder, a receiver, a valve controlling admission of the explosive to the receiver from the said tube, a cylinder having a discharge passage, a valve controlling communication between the receiver and cylinder, means whereby the valves controlling communication between the holder and the tube and tube and receiver shall be opened and closed to effect the passage of a charge of explosive from the holder into the receiver, means for opening and closing the valve controlling communication between the receiver and cylinder, means to effect the explosion of the charge within the cylinder, connections whereby pressure developed by the explosion within the cylinder shall be admitted to the receiver, means for closing such connections, and means for creating a partial vacuum in the receiver.

7. An internal combustion engine, comprising an explosive holder, a tube therein, a yielding-closed valve in said tube, a valve controlling communication between the tube and holder, a receiver having a tubular arm, a valve closing said arm, a valve controlling admission of the explosive to the receiver from the said tube, a cylinder having a discharge passage, a valve controlling communication between the receiver and cylinder, means for opening the valve of said tubular arm, a check valve adapted to open and permit pressure to pass from said receiver to the atmosphere when the valve of said tubular arm is opened, means to create

a partial vacuum in said arm and the receiver while the last-named valve is opened, means to close said valve while such partial vacuum continues, means whereby the valves
 5 controlling communication between the holder and the tube and tube and receiver shall be opened and closed to effect the passage of a charge of the explosive from the holder into the receiver, and yielding means
 10 holding the valve controlling communication between the receiver and cylinder in closed position.

8. An internal combustion engine, comprising a receiver for the explosive charges,
 15 a valve controlling the entranceway of the receiver for such charges, a cylinder having a discharge passage and connected to the discharge end of the receiver and indirectly at a point between the discharge end of the
 20 latter and said valve, a valve controlling communication between the same and the cylinder at the discharge end of the receiver, means controlling the said indirect connection, means for opening the valve controlling
 25 the discharge end of the receiver, means for causing the valve of the said indirect connection to close said connection, and means to open up communication between the receiver and the atmosphere after the
 30 last-named valve is closed.

9. An internal combustion engine, comprising a receiver for the explosive charges,

a valve controlling the entranceway of the receiver for such charges, a cylinder having
 a discharge passage and connected to the
 35 discharge end of the receiver and indirectly at a point between the discharge end of the latter and said valve, a valve controlling communication between the same and the
 40 cylinder at the discharge end of the receiver, means controlling the said indirect connection, means for opening the valve controlling the discharge end of the receiver, means for causing the valve of the
 45 said indirect connection to close said connection, means to open up communication between the receiver and the atmosphere after the last-named valve is closed, means to produce suction through the point of communication between the receiver and the at-
 50 mosphere to create a partial vacuum in the receiver, means for closing the point of communication between the receiver and the atmosphere as the suctional action ceases, and
 55 means for reopening the valve controlling the indirect connection between the cylinder and receiver.

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

WILLIAM L. WHEELER.

Witnesses:

HELEN C. RODGERS,
 G. Y. THORPE.