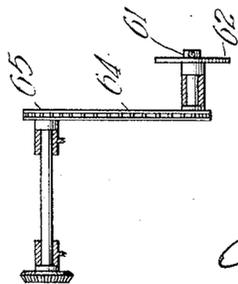
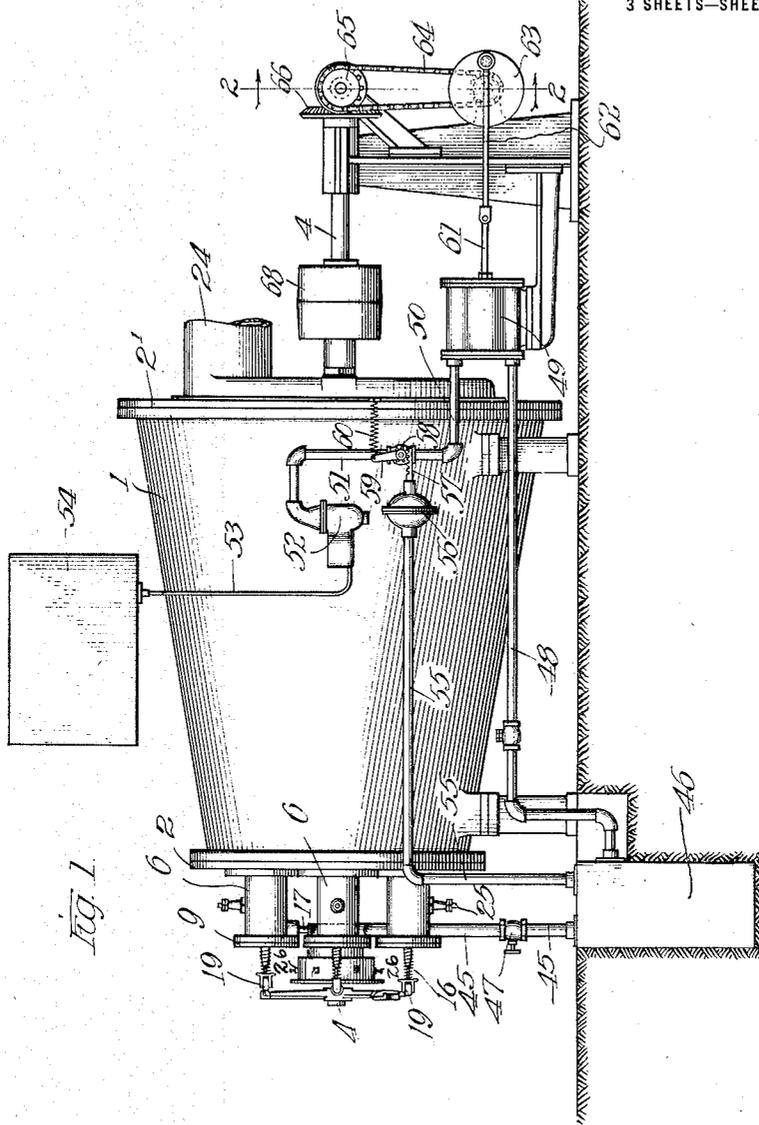


O. F. RING.  
 ROTARY INTERNAL COMBUSTION ENGINE.  
 APPLICATION FILED MAY 17, 1915.

1,237,387.

Patented Aug. 21, 1917.

3 SHEETS—SHEET 1.



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Fig. 2.

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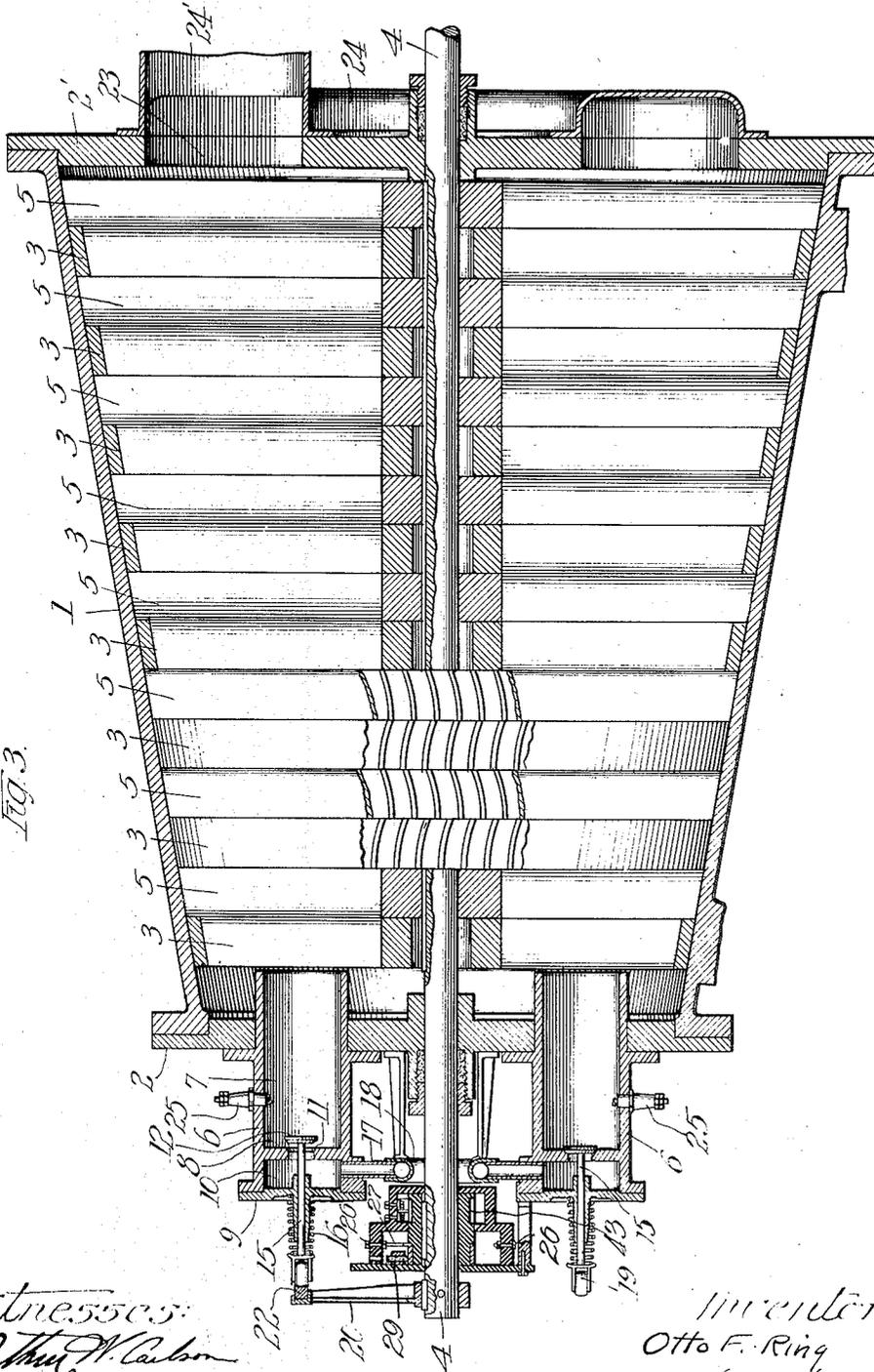


Fig. 3.

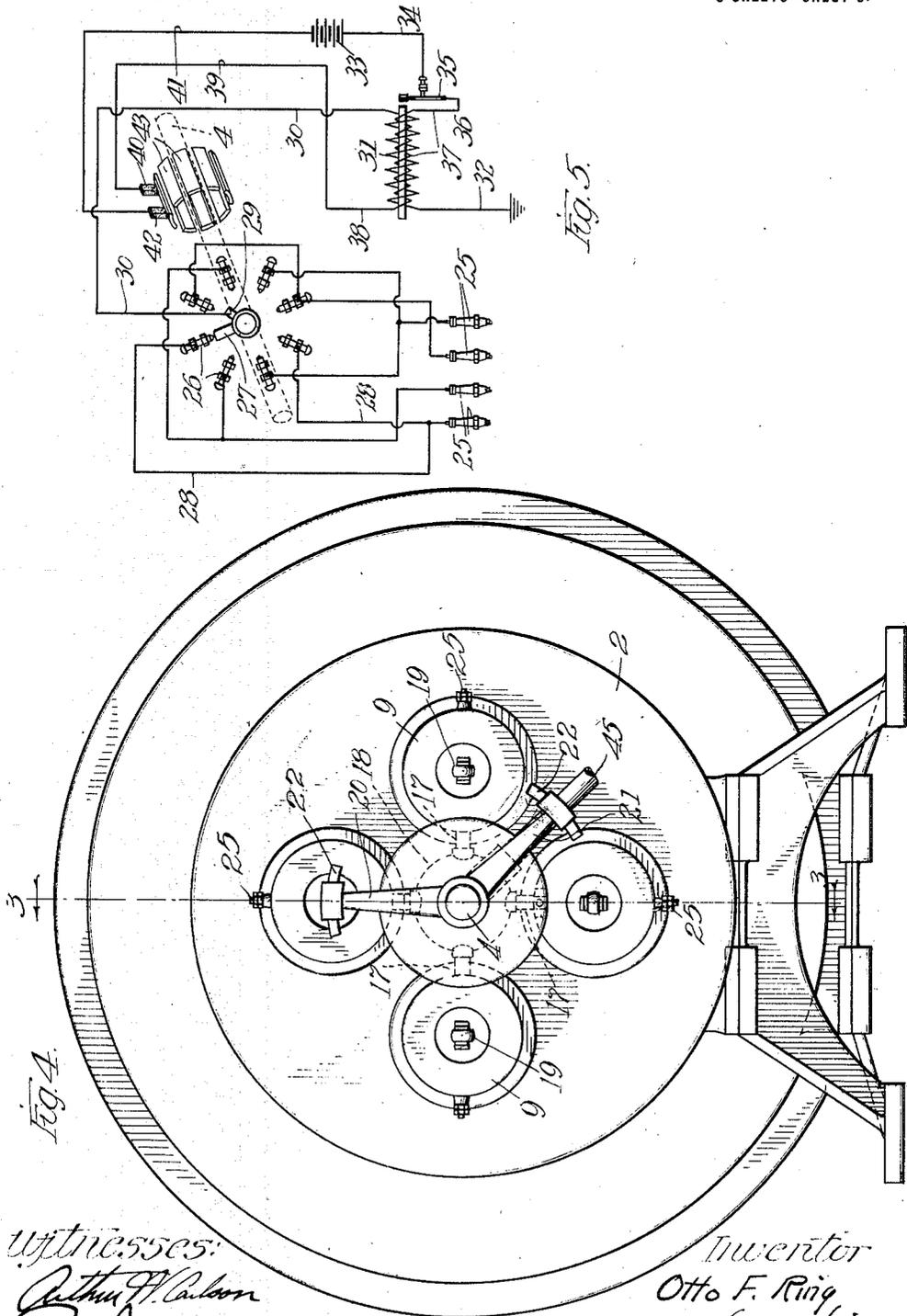
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Witnesses:  
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# UNITED STATES PATENT OFFICE.

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ROTARY INTERNAL-COMBUSTION ENGINE.

1,237,387.

Specification of Letters Patent. Patented Aug. 21, 1917.

Application filed May 17, 1915. Serial No. 28,637.

*To all whom it may concern:*

Be it known that I, OTTO F. RING, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Rotary Internal-Combustion Engines, of which the following is a description.

My invention belongs to that general class of devices known as internal combustion engines, and relates particularly to a rotary or turbine internal combustion engine. My invention has among its objects the production of a device of the kind described that is simple, convenient, durable, efficient and satisfactory, applicable wherever desired, for stationary or portable use. Many other objects and advantages of the construction herein set forth will appear to those skilled in the art to which the invention pertains from the disclosure made herein.

To this end my invention consists in the novel construction, arrangement and combination of parts herein shown and described, and more particularly pointed out in the claims.

In the drawings, wherein like reference characters indicate like or corresponding parts,

Figure 1 is a side elevation of one form of my improved device, illustrating more or less diagrammatically a portion of the co-operating parts;

Fig. 2 is a sectional view taken substantially on line 2, 2 of Fig. 1;

Fig. 3 is a sectional view through the engine, taken substantially on line 3, 3 of Fig. 4;

Fig. 4 is an end elevation of the same, and

Fig. 5 is a diagrammatic view, illustrating one form of arrangement of the ignition apparatus.

Referring to the drawings, particularly to Fig. 3, 1 is a suitable casing provided with means for supporting the same and securing it in place. The device shown has heads or ends 2 and 2', which may be secured in place in any of the well known manners. Extending centrally through the casing 1 is a rotatable shaft 4, the same being provided with suitable bearings, stuffing boxes, and the like. Arranged within the casing 1 are a plurality of fixed blades 3, the same being supported by the casing and entirely free from the shaft. Secured to the shaft are

rotors 5, or rotary blades, the fixed blades and rotary blades being arranged alternately, preferably as shown. It will be noted that the casing is substantially coneshaped, the diameter of the fixed and rotary blades being increased in diameter for the purposes hereinafter set forth. The fixed and rotary blades form substantially a series of inclined planes, and they may be of any suitable design and proportioned to give the most efficient results. These may vary to a considerable extent, and depend on the design of the other part of the engine, the size or horse power to be derived, and the number of rotors. There is, however, more or less similarity to the blades in the ordinary steam turbine.

Arranged in the head 2, and carried thereby, are one or more of what may be termed cylinders 6, four cylinders being shown, which may be secured to the head 2, or cast integral therewith, as may be preferred. The cylinders 6 are each provided with a transverse partition 8 in the preferred construction, and with heads 9 forming substantially a firing chamber 7, open at one end to the interior of casing 1, and a charge chamber 10. The passage of the charge of combustible from chamber 10, which is connected with a suitable source of supply hereafter described, to the firing chamber 7, is controlled by a valve 12, arranged to cooperate with the valve seat, arranged at the opening 11 through the partition 8. I have shown the valve 12 provided with a stem 15, extending through the head 9 of the cylinder, and a spring 16 for normally maintaining the valve in its closed position. The charge chamber 10 is connected by a pipe 17 to a manifold 18, to which the charge under pressure is conducted, as hereafter set forth.

The valves 12 are controlled preferably by one or more arms, carried by shaft 4. In the construction shown, I form or provide arms 20 and 21 (see Fig. 4) on the shaft 4, the same being formed with parts 22, arranged to cooperate with the ends of the valve rods 15. To reduce friction, I have shown rollers 19 on the ends of the rods, arranged to cooperate with the parts 22. Upon the number of arms depends the number of explosions in the several cylinders for each revolution of the shaft 4. It may be mentioned that in the device shown I have provided four cylinders and two arms, so that there

are eight explosions for each rotation of the shaft 4, the order of firing cylinders being preferably in the order of 1—3—2—4 and 3—1—4—2, the ignition apparatus or mechanism for firing the cylinders in the above order to correspond with the opening of the valves, as shown in Fig. 5, and will be hereafter referred to. The head or end 2' is formed with the desired number of exhaust openings 23, which are covered by an exhaust manifold 24, having an exhaust pipe or discharge 24', through which the waste products of combustion may be discharged.

In the ignition apparatus shown, I employ a spark plug 25 for each cylinder 6, a jump spark ignition being shown. It might be mentioned, however, that a make-and-break ignition might be employed if desired. Arranged about the shaft are a plurality of contact members 26 (see Figs. 3 and 5) which are suitably connected by conductors to the spark plugs 25. Arranged on the shaft is a contact member 27, which is connected by a conductor 30 to a secondary coil 31, which may be grounded as at 32, it being understood that the plugs are also grounded. A primary coil 37 is connected with a source of energy, as for example, a battery 33, by conductors 34, 35 and 36, the usual vibrator 35 being employed, as shown. The coil is also connected by a conductor 38 to a contact 40, arranged to cooperate with a commutator 43, carried upon the shaft, which also cooperates with the contact 42, also connected to the battery by conductor 41, or its equivalent.

In Fig. 1, I have shown more or less diagrammatically, the apparatus for supplying the explosive charge under pressure to the several cylinders. By "diagrammatically," I mean that the parts are not shown in detail, and are arranged so as to most conveniently and clearly show the construction. The intake manifold 18 is connected by pipe 45 to a pressure tank or reservoir 46, 47 being a throttle, which may be arranged between the pressure tank and the cylinders, if so desired. The pressure tank 46 is connected by pipe 48 to a compressor or pump 49, which is connected by pipe 50 and 51 to a carbureter 52, and piped as at 53 to a suitable supply tank 54. The pump may be actuated by a pump rod 61—62, connected through the disk 63 and suitable sprockets and chain 54, to a gear 65, in mesh with gear 66, arranged on the shaft 4, or any suitable equivalents. As is obvious, as the shaft 4 is rotated through the mechanism referred to, it actuates the pump and forces a charge in the reservoir, or pressure tank 46. I have shown regulating mechanism arranged between the pump and carbureter 52, consisting of a pipe 55, a diaphragm 56 having a rack 57, arranged to mesh with a pinion 58, which actuates a suitable valve or throt-

tle (not shown) within pipe 51. A lever 59 and spring 60 tend to normally keep the throttle in operative running position.

The operation of the device may be briefly described as follows: Assuming that the engine is provided with the carbureting mechanism, pump, pressure tank, etc., and that the valve-controlling mechanism and ignition system is arranged for eight explosions for each revolution of the shaft 4, which drive the power transmitting pulley 68. As shown in Figs. 3 and 4, the valve 12 in one of the cylinders is shown, so that a charge can flow from the supply chamber 10 into the cylinder. The remaining valves are successively opened by the two arms. As the arm 20 releases the valve rod 15, the valve 12 closes, and at the proper time, depending upon the adjustment of the parts of the timer, the contact member 27 contacts with the contact 26 (see Fig. 5) closing a circuit and firing the charge in the cylinder. The arm 21 thereafter opens the valve of the alternate or opposite cylinder, and this in turn fires, and so with the remainder. The cylinders shown are successively fired in the order of 1—3—2—4, and then 3—1—4—2, assuming that the top one is considered as 1, etc. As each charge is exploded, it expands into the casing 1, and passing through the fixed and rotatable blades, causes the rotors or rotatable blades to be driven, consequently driving the shaft. At the end of the casing the exhaust products of combustion pass out through the opening 23 into the exhaust manifold 24, and thence out through pipe 24'. It will be noted that the casing 1 is preferably substantially flared to allow the full expansion of the gas. The inclined planes are acted upon by the fired charges, which are at high temperature, and practically the full kinetic energy utilized. It may be mentioned that while I have not shown the parts of the engine water jacketed or otherwise cooled, such may be the case if desired. The operation is substantially similar with one arm instead of two, except, of course, that there are only four explosions for each complete rotation of the shaft, and the timing mechanism and ignition circuits shown in Fig. 5 slightly changed, or that is, the unnecessary circuits are omitted. It will be particularly noted, however, that while there are what may be termed four cylinders to the engine, the effect is the same as eight cylinders. By providing the charge storing chamber 10 at each cylinder, it will be noted that there is always a considerable charge of gas or explosive mixture at the cylinder ready to be forced in the cylinder under pressure at each time the valve opens. This makes it possible to have the valves open but a short interval. While I have shown what is known as a jump spark ignition, a make-and-break ignition system

might be employed should the same be preferred. When running there is practically no vibration, nor is a muffler needed. It will be particularly noted that internal lubrication is not necessary within the casing, as the shaft is supported at the ends in the preferred construction shown.

Having thus described my invention, it is obvious that various immaterial modifications may be made in the same without departing from the spirit of my invention; hence I do not wish to be understood as limiting myself to the exact form, construction, arrangement, or combination of parts herein shown and described, or uses mentioned.

What I claim as new and desire to secure by Letters Patent is:—

1. In a device of the kind described, the combination with a casing, of a shaft extending longitudinally therethrough, a series of propelling blades carried by said shaft and casing, said casing being provided at one end with a removable cylinder having an open end terminating within the interior of the casing and provided with a part thereof located outside of the casing so as to be freely accessible, means for forcing a charge of combustible into the chamber, means for periodically controlling the admission of the charge, and means for firing the same.

2. The combination in a rotary combustion engine, of a suitable casing gradually increasing in cross sectional area from one end toward the other, a plurality of rotor members arranged in said casing, each provided with suitable blades, suitable stationary members arranged between said rotors, each provided with suitable blades, a supporting shaft for said rotatable rotors extending through the casing from end to end, said rotors secured thereto, a plurality of cylinders extending outwardly from the smaller end of said casing and extending parallel with the shaft, each cylinder provided with a firing chamber opening to the interior of said casing, and with a compression chamber in communication with said firing chamber, a valve for each cylinder, arranged to control the passage of a charge of combustible from said compression chamber into the firing chamber, means for actuating said valves at predetermined intervals, means for firing the charge in said firing chamber at predetermined intervals, means

for supplying a combustible to said compression chamber under pressure, and means for regulating the pressure of said combustible.

3. In a device of the kind described, the combination with a casing, a shaft extending therethrough, blades on said shaft, a plurality of removable cylinders carried by one end of the casing extending parallel with the shaft and disposed within the area described by the borders of said end, the said cylinders having communications with the interior of the casing, and having portions thereof located exteriorly of the casing, a valve for each of said cylinders to control the admission of fuel thereto, means for actuating said valve, and means for igniting said fuel at predetermined intervals.

4. In a device of the kind described, the combination with a casing, a shaft extending therethrough, blades on said shaft, a plurality of independently removable cylinders carried by one end of the casing extending parallel with the shaft and disposed within the area described by the borders of said end, the said cylinders having communications with the interior of the casing, a valve for each of said cylinders to control the admission of fuel thereto, means for actuating said valve, and means for igniting said fuel at predetermined intervals, said actuating means for the valve comprising an arm carried by the shaft and adapted to shift said valves intermittently upon the rotation of the shaft.

5. The combination in a combustion engine of the character described, of a casing, a plurality of rotors in said casing each provided with suitable blades, said casing having a plurality of cylinders at one end thereof, said cylinders being open ended and having their inner portions disposed within the casing whereby the same directly discharge the products of combustion into the interior of the casing, a valve controlling the admission of fuel to said cylinders, and means for igniting said fuel at a predetermined time.

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

OTTO F. RING.

Witnesses:

ROY W. HILL,  
CHARLES I. COBB.