S. B. STEVENSON.

ROTARY ENGINE—EXPLOSIVE TYPE.

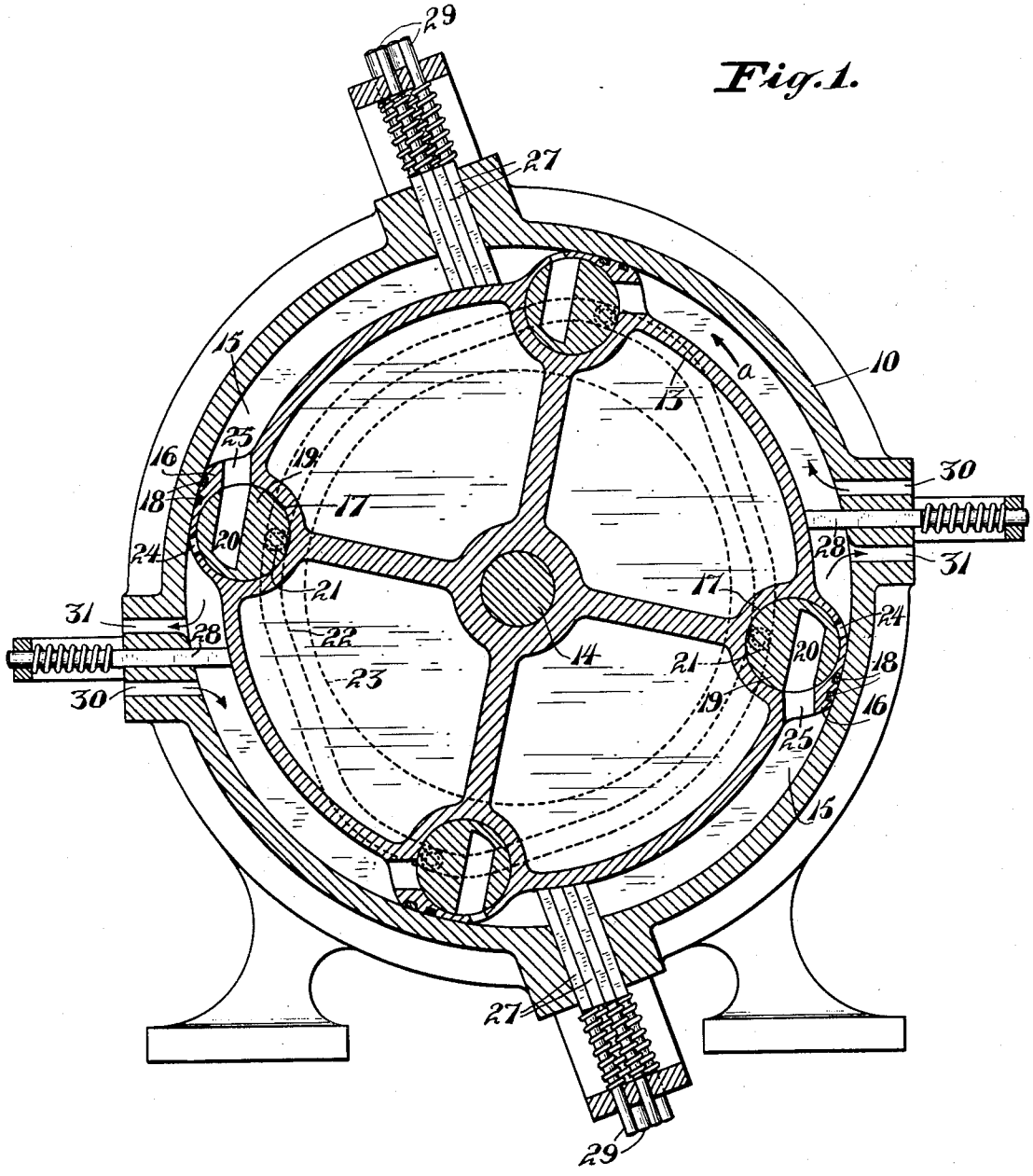
APPLICATION FILED JUNE 17, 1918.

1,319,932.

Patented Oct. 28, 1919.

2 SHEETS—SHEET 1.

Fig. 1.



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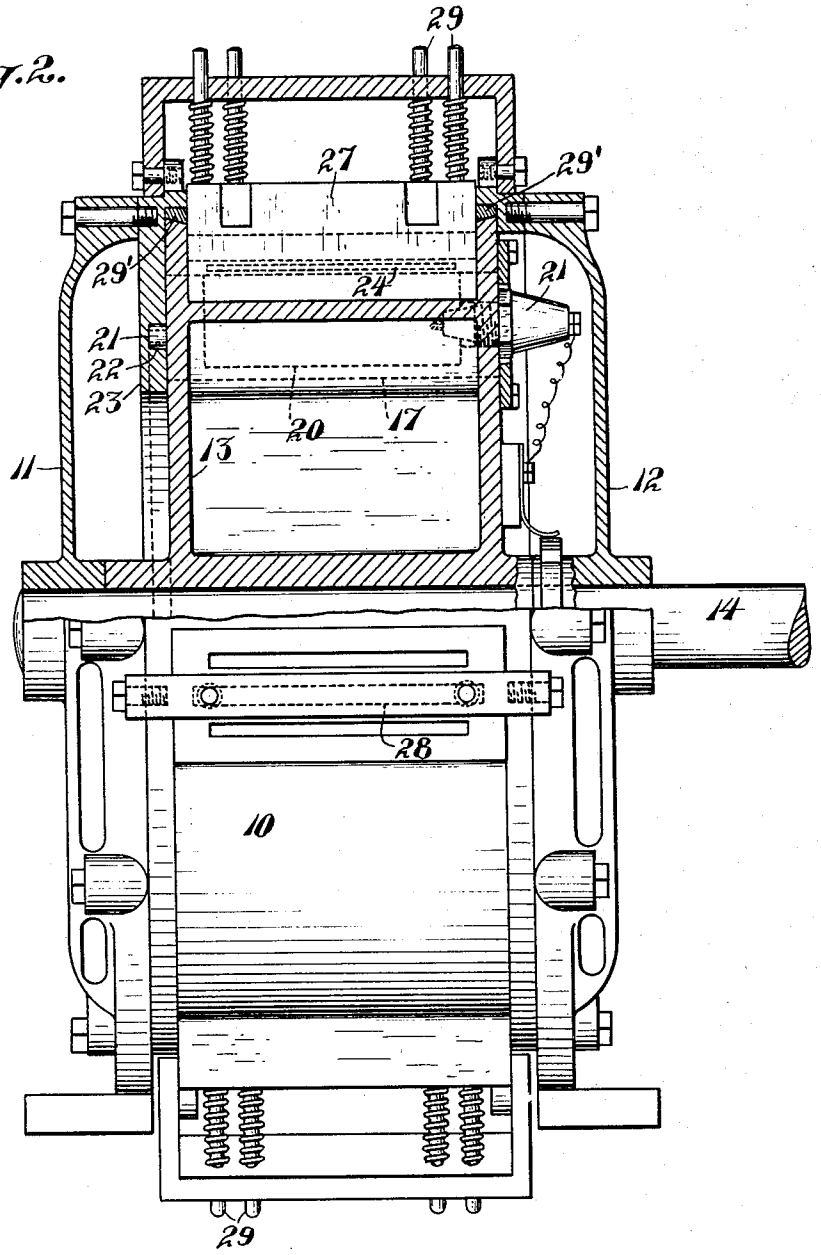
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2 SHEETS—SHEET 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

SAMUEL B. STEVENSON, OF SAN FRANCISCO, CALIFORNIA.

ROTARY ENGINE—EXPLOSIVE TYPE.

1,319,932. Specification of Letters Patent. Patented Oct. 28, 1919.

Application filed June 17, 1918. Serial No. 240,333.

To all whom it may concern:

Be it known that I, SAMUEL B. STEVENSON, a citizen of the United States, residing at the city and county of San Francisco and State of California, have invented new and useful Improvements in Rotary Engines—Explosive Type, of which the following is a specification.

This invention relates to an internal combustion engine, and particularly pertains to an engine of the rotary type.

It is the principal object of this invention to provide a rotary engine of the explosive type, which is formed with few parts, adapted to readily operate in synchronism without the material possibility of binding, and which will effectively compress and explode charges of gas to produce direct rotary motion.

The present invention contemplates the use of a cylindrical casing within which a single rotor is positioned, said rotor being supplied with rotary pistons adapted to coöperate with yieldable distributing members to compress and explode charges of gas, and thereafter to scavenge the explosive chambers of the structure.

The invention is illustrated by way of example in the accompanying drawings in which—

Figure 1 is a view of side elevation illustrating the completely assembled engine with parts removed to disclose the operation thereof.

Fig. 2 is a view in end elevation illustrating the engine with certain parts broken so to more clearly disclose the construction of the pistons and the yieldable gates.

Referring more particularly to the drawings, 10 indicates an annular body casting forming a cylindrical shell at the opposite ends of which are bolted end castings 11 and 12. The cylindrical shell is formed with a circular opening extending entirely through it to receive an engine rotor 13. This rotor is fixed to a horizontally disposed drive shaft 14. The opposite ends of the drive shaft are suitably housed within bearings formed through the opposite end castings 11 and 12, and permit free rotation of the shaft with its rotor. The outer diameter of the rotor is considerably less than the inner diameter of the shell 10 within which it is concentrically mounted. This forms an annular explosive chamber between the rotor and the shell. The annular passage way here referred to is divided into four explosive chambers 15, which are separated by laterally extending projections 16 upon the rotor circumference. These projections are substantially semi-circular in cross section and extend the length of the rotor. They are formed as a part of the main rotor casing and combine with cylindrical portions thereof to form laterally extending pockets 17. The outer face of each of the portions 16 normally bears against the inner circumference of the shell 10, and the space between is sealed by appropriately arranged packing members 18.

The pockets 17 are cylindrically bored, and are each adapted to receive what might be termed a cylindrical piston 19. These pistons are in the form of cylinders closely fitting within the pockets, and adapted to be rotated by means hereinafter described. A transversely extending casing chamber 20 is formed in each of the pistons, and extends outwardly through one side thereof. The pistons are provided at one end with spark plugs 21, which may ignite the charge of gaseous fuel within the chamber 20, and at their opposite ends with outwardly extending rollers 21. These rollers produce a partial rotation, or, in fact, an oscillation of the pistons as they traverse a cam groove 22 formed in the face of false end wall 23. One of these walls is mounted contiguous to each end of the rotor, and effectively seals the chamber 15.

The shape of the cam groove 22 is such that during one rotation of the rotor the pistons 19 will be oscillated substantially a quarter of a circle. In this manner the chamber 20 will be caused to alternately register with an intake port 24 in the front side of the rotor portion 16, and an explosive and exhaust port 25 in the rear side of said member. It will thus be seen that this cam and the rollers constitute the entire timing mechanism of the device. The rotor is formed with end flanges along walls which extend outwardly from the circumference of the rotor drum, and form flanges substantially fitting within the bore of the shell. These flanges, of course, are spaced apart the distance between the ends of the rotor, and receive the gate members between them. The gate members are of two classes: Intake gas gates 27 and exhaust gas gates 28. The intake gates are disposed in sets in diametrical relation to each other,

and are mounted for substantial rotary movement in bearings at the top and bottom of the shell 10. As specially shown in Fig. 2, the gates are formed with stems 29, which are fitted with springs adapted to hold them in frictional engagement with the outer periphery of the rotor and between the rotor flanges. The so-called intake gates are here shown as four in number, and are in the path of travel of the semi-circular projection 16 of the rotor. The outer surface of these projections are formed to readily wedge beneath the ends of the gates and cause them to lift, thereafter permitting them to be reseated upon the circumferential face of the drum. The exhaust gas gates 28 are spaced diametrically opposite each other, and arranged at right angles to the position of the first named gates. These members also have spring connections, which hold them yieldably against the rotor.

In order to properly seal the rotor against leakage of gas around its edges, wedge shaped annular packing rings 29 are provided as specifically shown in Fig. 2. It will be understood that the various other openings which might possibly allow the escape of gas are suitably packed by common means.

The motor under present consideration is what might be termed a two-cycle motor, that is to say, each one of the pistons effects two explosions in one revolution of the rotor. This makes it necessary to clear the explosive chambers of burned gas simultaneously with the admittance of fresh gas to the chamber. In the present instance this is effected by intake and exhaust ports 30 and 31 through the casing. These ports are arranged at opposite sides of the exhaust gas gates 28, the exhaust port being on the side of the gate toward which the rotor moves while the intake port is on the opposite side of the gate, and will supply gas to the explosive chambers after the exhaust gas has been forced out by the gates 28.

In the operation of the present invention the motor is assembled as particularly disclosed in the drawings, and the intake and exhaust ports upon the opposite sides of the engine casing are suitably connected with intake and exhaust pipes. The rotor of the engine is then rotated in the direction of the arrow —*a*— as shown in Fig. 1. After one of the protruding portions 16 of the rotor has passed the gate 28, it will seal the explosive chamber formed between it and the gate, thus creating a suction as the rotor moves to draw in a charge of explosive gas. Assuming that the preceding explosive chamber between two of the projections 16 has been filled with gas, it will be seen that the gas will then be compressed between the gate 27 and the projecting protrusion 16 on the rotor. Coincident with the advance of the piston toward the gate 27 it will be rotated so that this chamber 20 will register with the inlet port 24. This will cause the gas to pass into this chamber as it is being compressed. Immediately prior to the registry of the piston with the gate 27 the cam roller 21 is influenced by the cam groove 22 to rotate the piston from the port 24 and toward the port 25, and to seal it against the outer wall of the pocket 17. After the piston has passed the gates 27, which recede to accommodate it, the gates are again lowered to form a barrier for the next succeeding charge. In synchronism with these movements the piston continues to rotate until its chamber 20 is in register with the port 25. In this manner the chamber will form a continuation of the explosive chamber, which exists between the rotor and the gate 27. At this instant the spark is applied to the explosive mixture, and will cause the force of the explosion to act between the piston and the gate 27, thus delivering an explosive force to the rotor to cause its further rotation. As the gas has now been exploded, it is necessary to remove it from the rotor chamber. This is done as the piston and its casing pass beneath the exhaust gate 28 for this gate will form an obstructing barrier and divert the burned gas from the chamber surrounding the motor into the exhaust gas port from which point it will be dissipated. The sequence of operation is then continued throughout the rotation of the engine. As there are four pistons here shown, and each piston provides for two explosions to the revolution of the rotor, the action of the engine would be to provide a continuous torque machine, which would operate to rotate its shaft without material vibration and without objectionable binding of the parts involved.

It will thus be seen that the engine here disclosed, while possessing a few parts of simple design and construction, will, at the same time produce a machine operating in a desirable manner, and without involving large expense in its construction, or in its upkeep.

While I have shown the preferred form of my invention as it is now known to me, it is to be understood that various changes in the combination, construction and arrangement of parts may be made by those skilled in the art without departing from the spirit of the invention as claimed.

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

1. A rotary internal combustion engine comprising a cylindrical casing, a cylindrical rotor upon an axis concentric with the casing, said rotor forming an annular channel within the casing and having a plurality

of transverse cylindrical chambers in its periphery, the outer half of said chambers projecting across the annular channel and forming a movably tight fit with the interior of the casing, and cylindrical transfer valves fitting and turnable within the chambers.

2. In a rotary internal combustion engine, a casing with a concentric rotor forming an annular channel with the casing, a plurality of transverse chambers on the periphery of the rotor extending across the channel and forming tight moving joints with the casing, cylindrical pistons fitting and rotatable within the chambers having pockets adapted to receive charges of compressed gas, and ports through the sides of the chambers with which the pockets may register when turned to discharge the compressed gas into the annular channel.

3. A rotary internal combustion engine comprising an outer casing, a concentric rotor forming an annular channel with the casing and having transverse cylindrical chambers upon the periphery projecting to form tight running joints with the casing, pistons within the chambers with compression pockets, means to oscillate the pistons, ports formed in the chambers with which the pockets may register to discharge the compressed gas into a section of the annular channel, and slidable gates or abutments by which the channel may be closed and opened.

4. In a rotary internal combustion engine of the character described, a casing, a rotor revoluble within the casing and forming an annular channel within the casing, transverse cylindrical chambers upon the periphery of the rotor, projecting into the channel and forming tight running joints, pistons in the chambers with compression pockets and means by which said pistons are oscillated, inlet and exhaust ports positioned to alternately communicate with the pockets, sliding gates or abutments movable to open and close the annular channel with relation to the movements of the rotor and coöperating to form alternate compression and exhaust chambers.

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

SAMUEL B. STEVENSON.

Witnesses:
JOHN H. HERRING,
W. W. HEALEY.