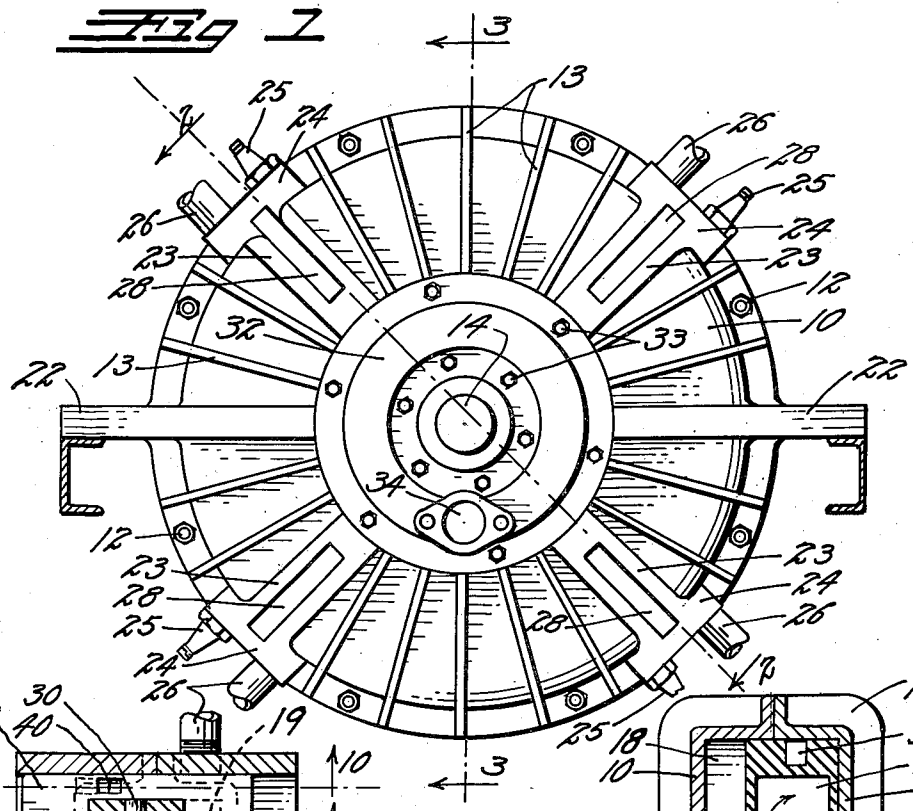
Feb. 2, 1932. W. G. TYLER 1,843,409

ROTARY MOTOR

Filed April 26, 1929 3 Sheets-Sheet 1

Fig 1



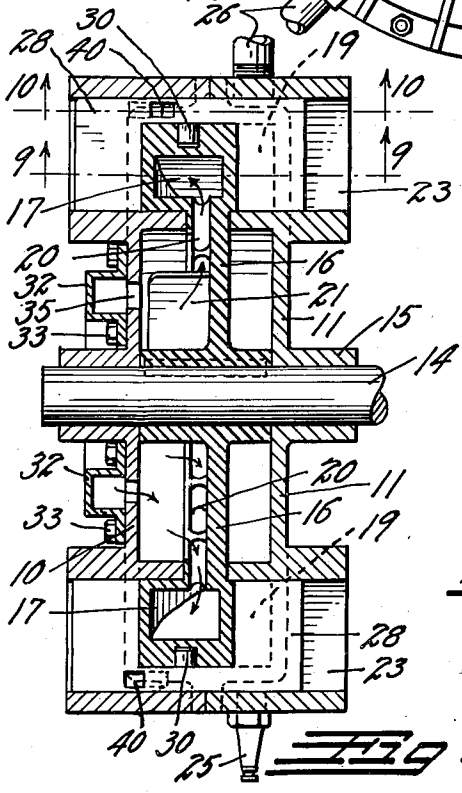


Fig 2

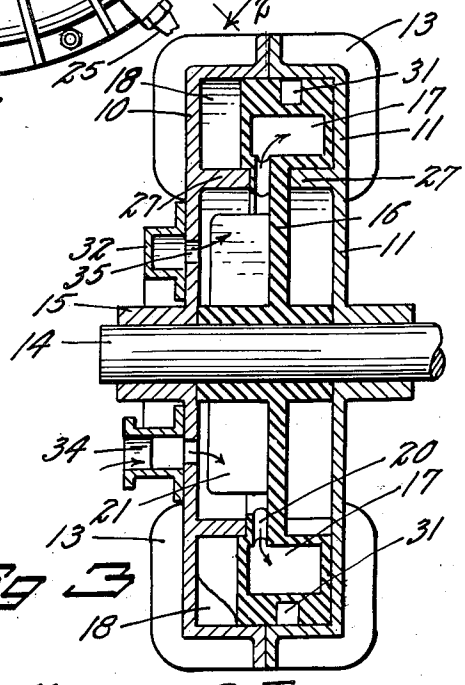


Fig 3

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ROTARY MOTOR

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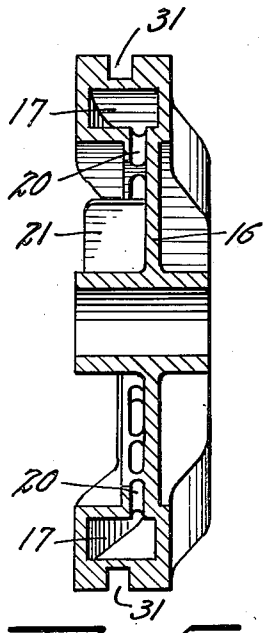

Fig 5

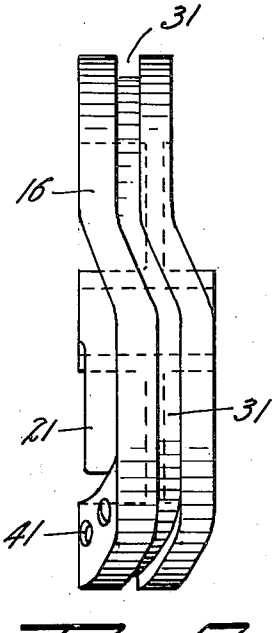

Fig 6

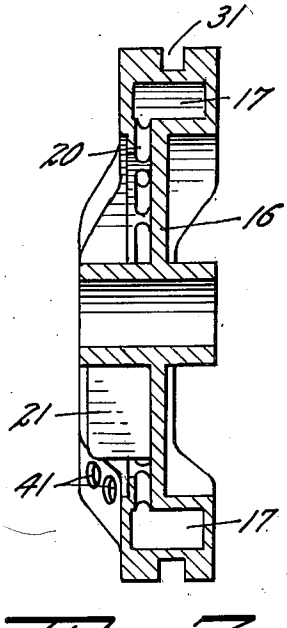

Fig 7

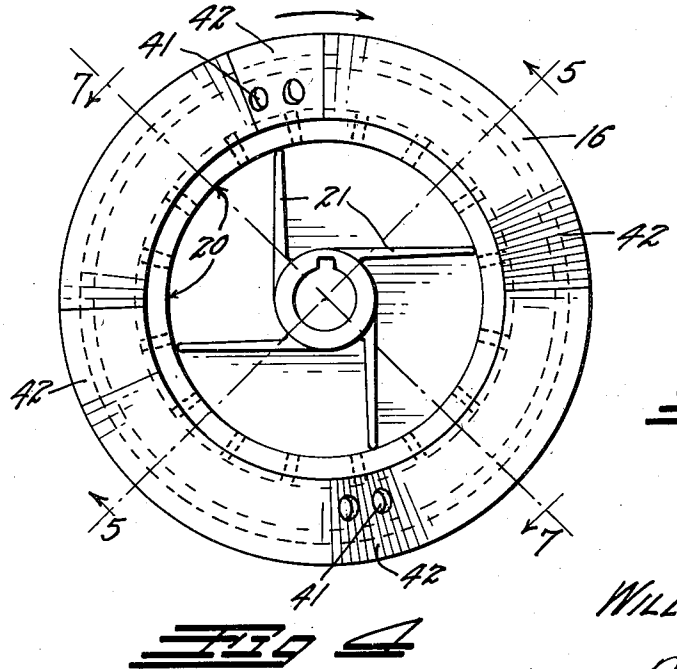

Fig 4

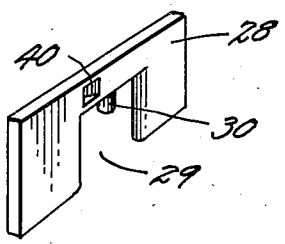

Fig 8

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ROTARY MOTOR

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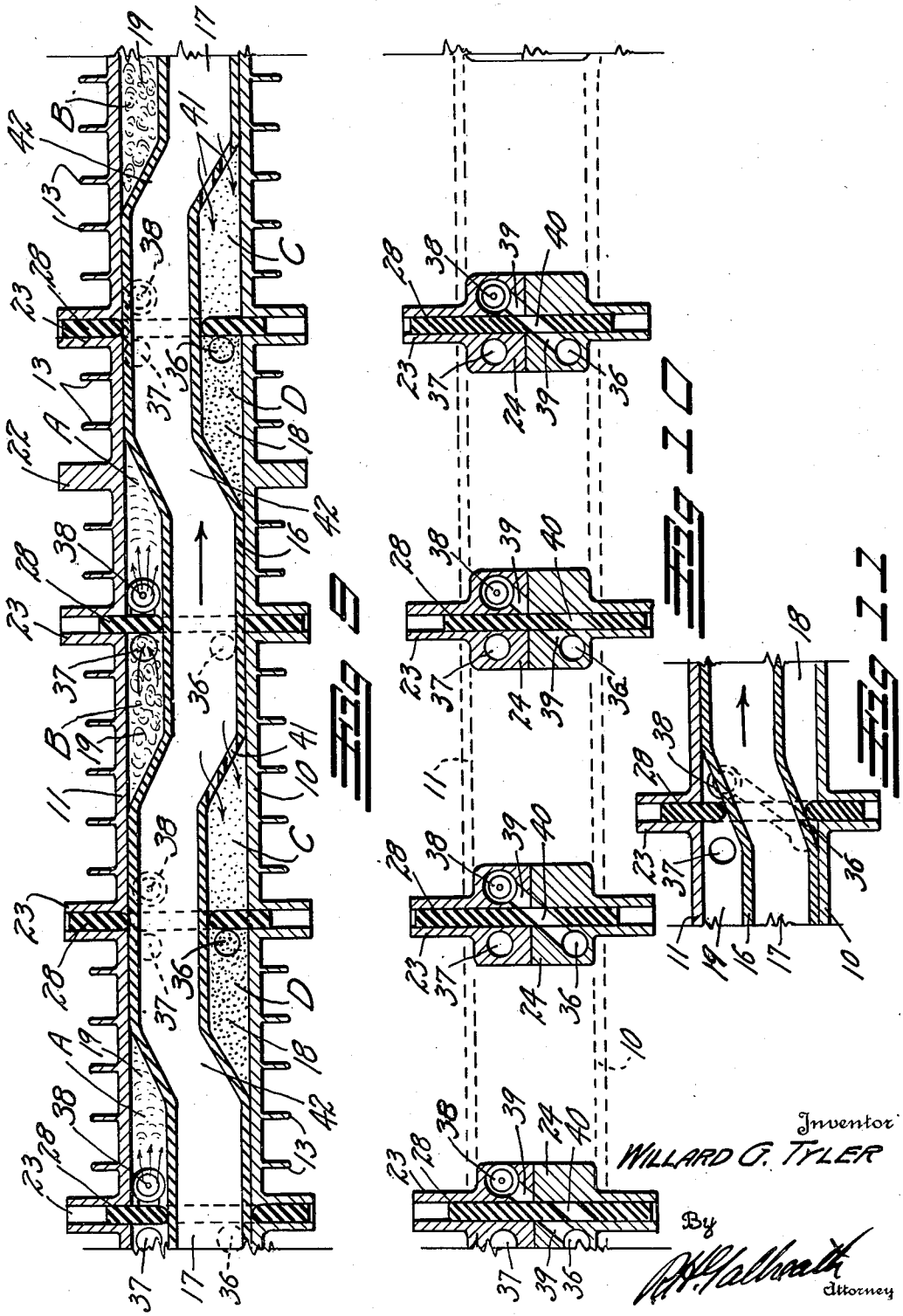

Patented Feb. 2, 1932 1,843,409

UNITED STATES PATENT OFFICE

WILLARD G. TYLER, OF DENVER, COLORADO

ROTARY MOTOR

Application filed April 26, 1929. Serial No. 358,256.

This invention relates to a rotary motor of the internal combustion type and has for its principal object the provision of a motor in which the explosion forces will act directly upon a rotary element without the use of reciprocating pistons, connecting rods, cranks, etc.

Another object of the invention is to construct an engine of this type which will not require tappet valves or valve operating mechanisms.

A still further object of the invention is to construct the device so that it will operate to compress the gases prior to explosion.

Other objects and advantages reside in the detail construction of the invention, which is designed for simplicity, economy, and efficiency. These will become more apparent from the following description.

In the following detailed description of the invention reference is had to the accompanying drawings which form a part hereof. Like numerals refer to like parts in all views of the drawings and throughout the description.

Fig. 1 is an end elevation of the motor.

Fig. 2 is a diagonal section through the engine, taken on the line 2—2, Fig. 1.

Fig. 3 is a vertical section therethrough taken on the line 3—3, Fig. 1.

Fig. 4 is a detail view illustrating a side elevation of the rotor employed in the motor.

Fig. 5 is a cross section through the rotor taken on the line 5—5, Fig. 4.

Fig. 6 is an edge elevation of the rotor.

Fig. 7 is a second cross section through the rotor taken on the line 7—7, Fig. 4.

Fig. 8 is a detail perspective view of what will be hereinafter designated as the piston plates.

Fig. 9 is a circular section around the edge of the motor taken on the line 9—9, Fig. 2, and extended or developed to a common plane.

Fig. 10 is a similar circular section, also developed to a common plane, taken on the line 10—10, Fig. 2.

Fig. 11 illustrates a portion of the section of Fig. 9 with the rotor in a different position therein.

Construction

The motor comprises a circular housing formed of two housing sections 10 and 11 joined together by means of bolts 12. The sections 10 and 11 may be provided with radiating fins 13 for air cooling or if desired with a water jacket for water cooling. A shaft 14 passes axially through the housing sections 10 and 11 and is carried in bearing bosses 15 thereon. The housing may be supported from a supporting structure in any desired manner such as by brackets 22 extended outwardly from the sides thereof. Piston bosses 23 are formed on the outside of each of the sections 10 and 11 terminating at the periphery of the rotor in valve blocks 24 cast thereon. A spark plug 25 and an exhaust pipe 26 communicate through each of the valve blocks 24 to the interior of the housing section 11.

On the inner face of each of the housing sections 10 and 11 an inwardly projecting circular flange 27 is formed, which co-operates with the rim of a rotor 16 to form engine chambers within the housing.

The rotor 16 is keyed or otherwise affixed to the shaft 14. The rotor 16 comprises a circular casting having a relatively wide rim having a hollow feed cavity 17 formed therein. The cavity 17 opens toward the center of the rotor through a series of feed openings 20. Intake ports 41 open through the rearward faces of the diagonal portion, 42 of the rim. Fan blades 21 are cast upon the rotor to force the feed gases into the openings 20. The rim of the rotor 16 is formed with diagonal portions 42 so that it will alternate from one face to the other of the rotor as illustrated in Fig. 6, so as to leave open spaces between the rotor rim and the inner faces of the housing sections 10 and 11 so as to form the engine chambers, such as indicated at "A", "B", "C", and "D", in Fig. 9.

The chamber on one side of the rotor, such as indicated at 18, Fig. 3, form intake chambers and the chambers in the opposite side, such as indicated at 19, Fig. 2, form combustion chambers.

A piston plate 28 is slidably mounted in each of the piston bosses 23 and extend across the rim of the rotor 16. The mid-portion of the piston plate 28 is notched as shown at 29, to allow it to fit snugly over the rim of the rotor. Within this opening 29 a roller bushing 30 is placed which rides in a peripheral cam track 31 in the rotor 16.

Gas is fed to the housing from an intake manifold 32 which is secured to the housing 10 by means of cap screws 33. The gas enters the manifold 32 through a feed nipple 34 and is drawn into the housing by the suction of the fan 21 through intake openings 35.

It will be noted that, as the rotor 16 rotates the piston plates 28 will reciprocate laterally thereof actuated by the side to side placement of the rotor rim and the cam track 31. The side to side thrust on the piston plates 28 is absorbed by the roller bushing 30 so that wear on the edges of the notches 29 is eliminated.

In the section 10 of the housing a transfer port 36 is formed and in the section 11 of the housing an exhaust port 37 is formed immediately ahead of each of the piston plates 28. The exhaust ports 37 communicate with the exhaust pipes 26. In the section 11, immediately behind each of the piston plates a spark plug chamber 38 is formed. Each of the transfer ports is connected with the adjacent spark plug chamber 38 by means of a transfer passage 39 which extends diagonally through the valve blocks 24 over each of the piston plates 28. The transfer passages 39 are opened at predetermined times by means of transfer ports 40 formed in each of the piston plates.

Operation

The operation of the device is best illustrated with reference to the developed sections illustrated in Figs. 9, 10, and 11. In Fig. 9, chambers in which an explosion is taking place are indicated at "A", scavenging chambers at "B", intaking chambers at "C", and compressing chambers at "D".

Assume that the rotor is traveling to the right in Fig. 9, and that the housing remains in a fixed position. The action at this time is as follows: Gas is being drawn into the chambers "C", on the right of each of the piston plates 28, through the intake ports 41 from the cavity 17 in the hollow rotor rim, and gas is being compressed in the chambers "D" on the left of each of the pistons 28. An explosion is taking place in the chambers "A" on the right of the piston plates 28 and exploded gas is being scavenged from the chambers "B" on the left of each piston 28 through the exhaust ports 37. At this time the piston plates which divide the chambers "C" and "D" are in a position to align the transfer ports 40 with the transfer passages 39 so that the gas being compressed in the chambers "D" is also being compressed in the transfer passage 39 but can not escape at the opposite extremity thereof owing to the fact that the rim of the rotor 16 is closing the spark plug chamber 38.

This operation continues until the explosive force has rotated the rotor so that the diagonal or offsetting portion thereof 42 is passing the piston plates 28. At this time the rotor causes the piston plates to reciprocate so that opposite pistons will move in the same direction and adjacent piston plates will move in alternate directions.

As the diagonal portions 42 of the rotor rim move through the piston plates 28 it will uncover the spark plug chambers 38 of the chambers "B", as indicated in Fig. 11, allowing the compressed gas to flow from the right extremities of the chambers "D" through the transfer passage 39 into the chambers "B" in a highly compressed condition. Further movement of the rotor will cause the transfer ports 40 to move out of alignment with the transfer passage 39 so as to shut off communication between the explosion chambers and the intake chambers. At this time a spark will occur at two of the spark plugs causing the resulting explosion to continue to rotate the rotor.

Thus, it will be seen that a portion of gas is drawn from the rotor cavity 17 into the intake chambers 18 as indicated at "C" by the action of the first piston plate. This gas is then compressed by the second piston plate as indicated at "D". When it has reached its highest point of compression it is transferred over the second piston plate into the forward extremity of an explosion chamber as indicated at "A", and exploded therein. The expansion of the explosion between the second piston plate and the rotor rim will rotate the latter. A third piston plate will then enter the explosion chambers 19 and force the gas therefrom through the exhaust ports 37 and the exhaust pipes 26 as indicated at "B".

Any desired method may be employed for causing the spark to occur at the proper time such as by mounting a distributor upon the extremity of the shaft 14.

Any desired number of offsets 42 may be formed in the rotor. As illustrated four are employed which causes the explosions to be occuring simultaneously or four per revolution.

It is desired to call attention to the fact that if power were applied to the shaft 14 the mechanism will serve efficiently as an air compressor in which case the transfer passage 39, spark plug and chamber 38 and transfer port 40 would be unnecessary. The compressed air would flow from the device through the ports 36 and 37.

The engine is ideally suited to high speed

work and to high altitude flying in airplanes and the like because of the fact that the fan 21 acts as a supercharger and supplies the gas to the cavity 17 under greater than atmospheric pressure. The amount of pressure is directly proportional to the speed of the engine so that ideal supercharging conditions prevail.

While a specific form of the improvement has been described and illustrated herein, it is desired to be understood that the same may be varied, within the scope of the appended claims, without departing from the spirit of the invention.

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

1. A rotary engine comprising: a circular housing; a circular rotor within said housing, the periphery of said rotor being alternately offset from side to side to form chambers on alternate sides thereof within said housing; members carried by said housing and adapted to project into said chambers as said rotor rotates; means for supplying explosive gas to said chambers; said means comprising: a hollow rim on said rotor forming an annular intake passage therein; ports communicating between certain of said chambers and said intake passage; and means for supplying gases to said intake passage.

2. A rotary motor comprising: a circular housing; circular flanges projecting inwardly from said housing; a rotor within said housing; a rim on said rotor adapted to travel between said flanges and the periphery of said housing, said rim being offset from side to side to form chambers on opposite faces of said rotor; means for introducing gases into said rim; ports communicating between the interior of said rim and the chambers on one face of said rotor; passages in said housing communicating between said latter chambers and the chambers on the other face thereof; and means for creating an explosion in the chambers on said other face.

3. A rotary motor comprising: a circular housing; circular flanges projecting inwardly from said housing; a rotor within said housing; a rim on said rotor adapted to travel between said flanges and the periphery of said housing, said rim being offset from side to side to form chambers on opposite faces of said rotor; means for introducing gases into said rim; ports communicating between the interior of said rim and the chambers on one face of said rotor; passages in said housing communicating between said latter chambers and the chambers on the other face thereof; means for creating an explosion in the chambers on said other face; piston plates slidably mounted in said housing and arranged to pass over the rim of said rotor so as to divide said chambers as they pass, said piston plates arranged to follow the contour of said rim so as to act as pistons within said chambers as said rotor rotates, said plates adapted to open and close said passages as they reciprocate.

4. A rotary motor comprising: a circular housing; circular flanges projecting inwardly from said housing; a rotor within said housing; a hollow rim on said rotor adapted to travel between said flanges and the periphery of said housing, said rim being offset from side to side to form chambers on opposite faces of said rotor; means for introducing gases into said hollow rim; ports communicating between the interior of said rim and the chambers on one face of said rotor; passages in said housing communicating between said latter chambers and chambers on the other face thereof; piston plates slidably mounted in said housing and arranged to pass over the rim of said rotor so as to divide said chambers as they pass, said piston plates arranged to follow the contour of said rim so as to act as pistons within said chambers as said rotor rotates; and ports controlled by said piston plates so as to close said passages at certain positions of said rotor.

5. A rotary motor comprising: a stationary housing; a circular rotor adapted to rotate within said housing; a rim on said rotor, said rim comprising: compression chambers indented in one face of said rim; explosion chambers indented into the opposite face thereof and alternating with said compression chambers; a gas intake for said compression chambers; an exhaust outlet for said explosion chambers; piston plates transversely slidable within said housing and notched to fit over said rim so as to divide said chambers as said rotor rotates; transfer passages in said housing communicating between said compression chambers and said explosion chambers; and transfer ports formed in each of said piston plates, adapted to open and close said passages as said plates are reciprocated so as to admit the compressed gases from the compression chambers to the explosion chambers at predetermined times; and means for creating explosion in said explosion chambers.

6. In a rotary motor having a rotor with an irregular transverse contour so as to form compression chambers on one side thereof and explosion chambers on the other side thereof, with transversely slidable piston plates arranged to reciprocate with the contour of said rotor and divide said chambers; means for supplying gases to said compression chambers comprising: an annular intake passage extending continuous throughout the rim of said rotor; and entirely enclosed thereby; ports communicating between said passage and said compression chambers.

7. A rotary motor comprising: a flat disc-like rotor; a housing spaced from said rotor and extending inwardly adjacent the periphery thereof to form an intake chamber; an

enlarged rim surrounding the periphery of said rotor, said rim being alternately offset to form alternating compression and explosion chambers at opposite faces thereof; piston plates adapted to transversely slide in said housing and overlap said rim so as to divide all the chambers as said rotor rotates; a hollow circumferential intake space throughout the length of said rim and ports extending from said intake space rearward from the direction of rotation into said compression chambers so that gas will be drawn therein from said rim.

8. A rotary motor comprising: a flat disc-like rotor; a housing spaced from said rotor and extending inwardly adjacent the periphery thereof to form an intake chamber; an enlarged rim surrounding the periphery of said rotor, said rim being alternately offset to form alternating compression and explosion chambers at opposite faces thereof; piston plates adapted to transversely slide in said housing and overlap said rim so as to divide all the chambers as said rotor rotates; a hollow circumferential intake space throughout the length of said rim and ports extending from said intake space rearward from the direction of rotation into said compression chambers so that gas will be drawn therein from said rim; transfer passages in said housing extending across said rotor beyond the periphery thereof so as to transfer compressed gas from said compression chambers to said explosion chambers, said transfer passages being controlled by the reciprocation of said piston plates.

9. A rotary motor comprising: a flat disc-like rotor; a housing spaced from said rotor and extending inwardly adjacent the periphery thereof to form an intake chamber; an enlarged rim surrounding the periphery of said rotor, said rim being alternately offset to form alternating compression and explosion chambers at opposite faces thereof; piston plates adapted to transversely slide in said housing and overlap said rim so as to divide all the chambers as said rotor rotates; a hollow circumferential intake space throughout the length of said rim and ports extending from said intake space rearward from the direction of rotation into said compression chambers so that gas will be drawn therein from said rim; ports communicating from said intake chamber through the inner face of said rim to said intake space therein so as to supply the latter with gases.

In testimony whereof, I affix my signature.

WILLARD G. TYLER.