Feb. 17, 1925. 1,526,610

E. SELLBERG

ROTARY ENGINE

Filed June 14, 1923 3 Sheets-Sheet 1

Fig. 1.

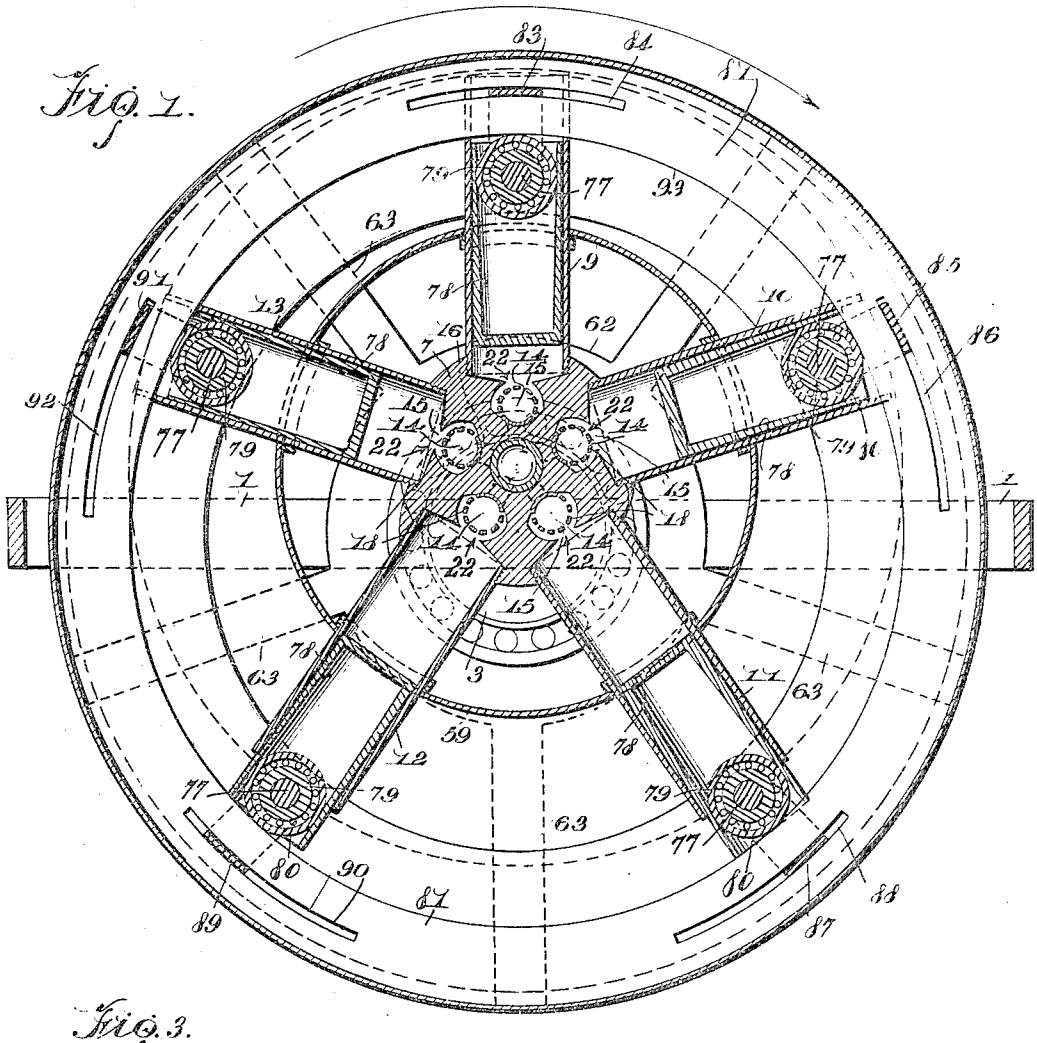
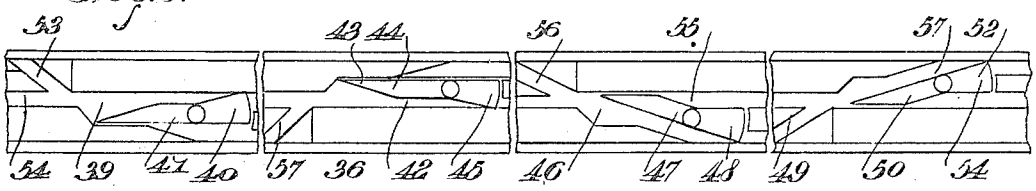


Fig. 3.



WITNESSES

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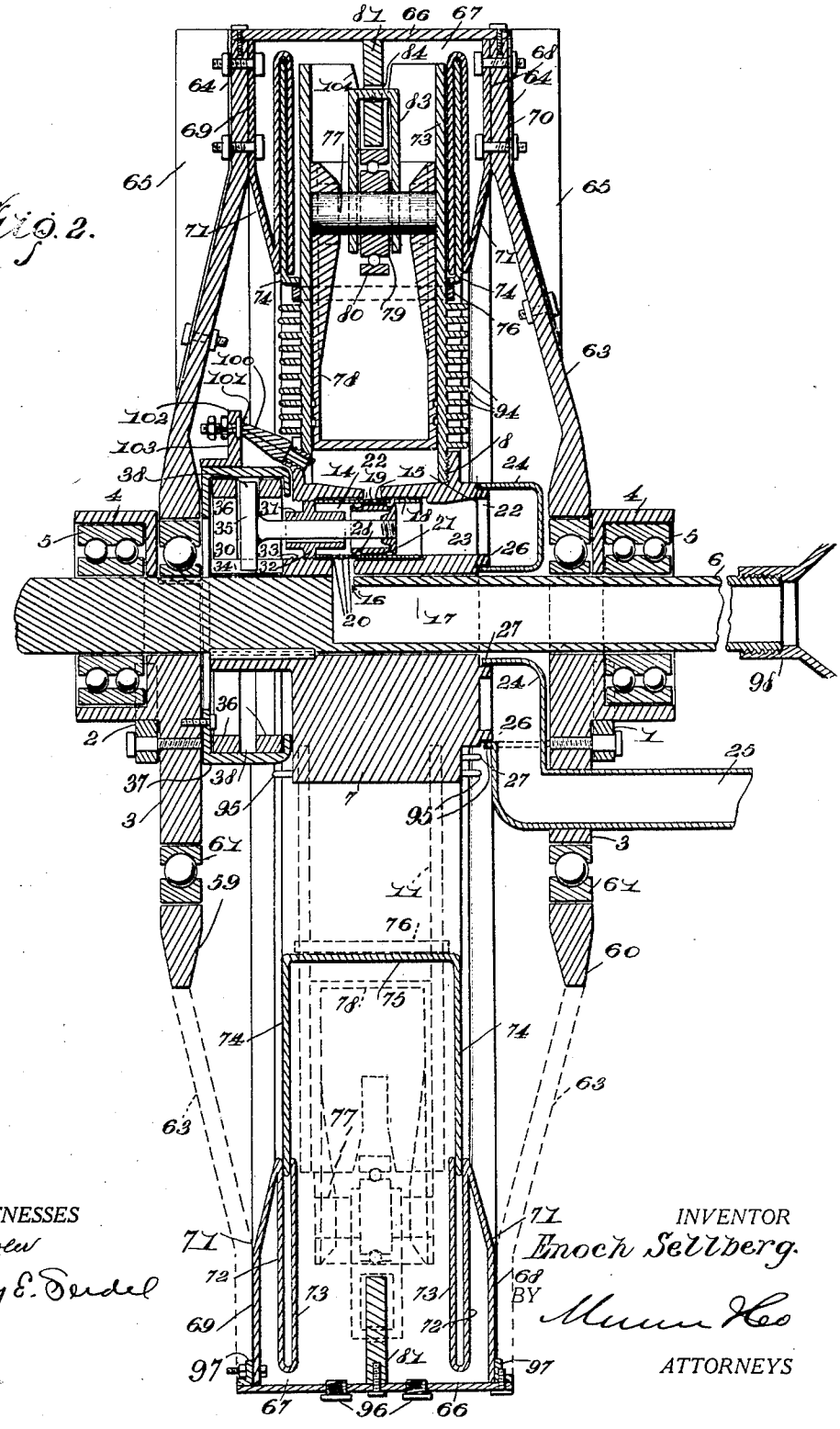
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Filed June 14, 1923 3 Sheets-Sheet 2

Fig. 2.



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Filed June 14, 1923 3 Sheets-Sheet 3

Fig. 4.

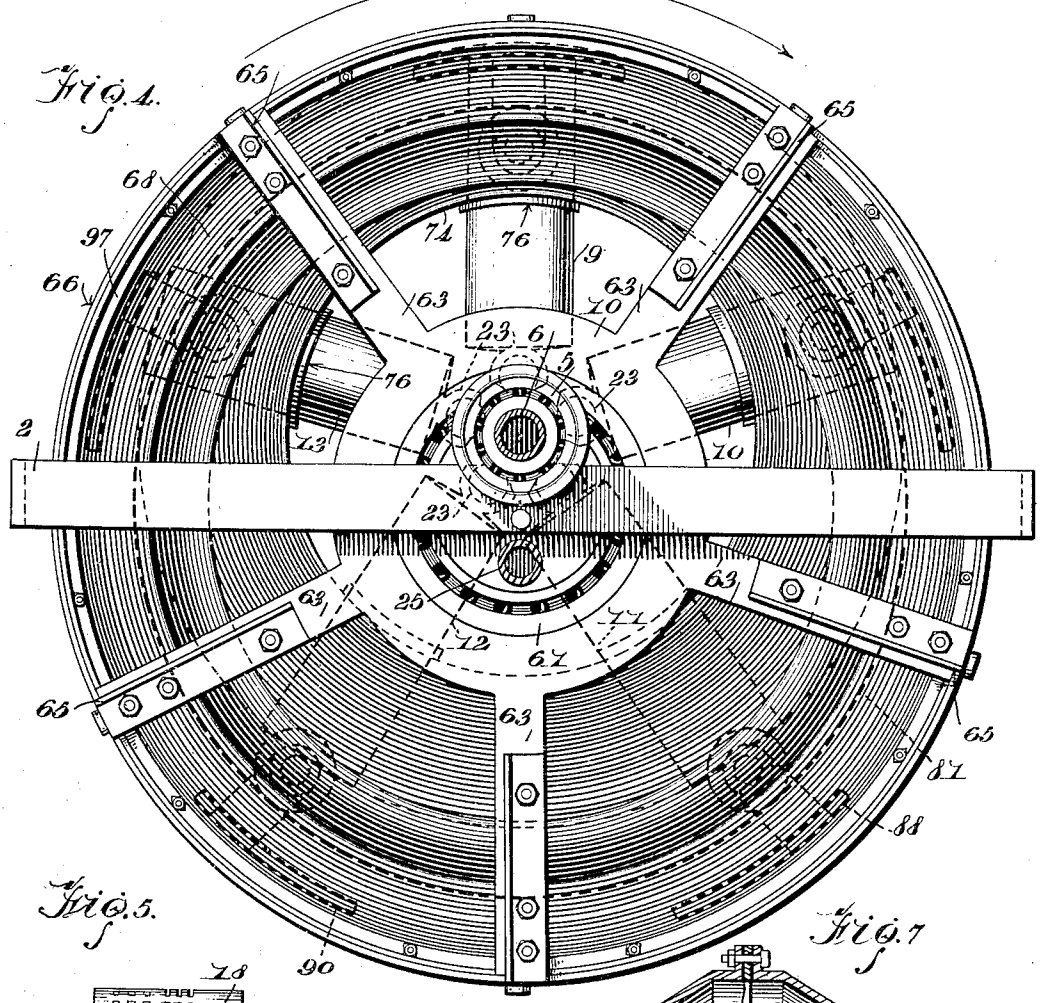


Fig. 5.

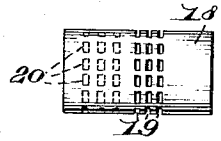


Fig. 7.

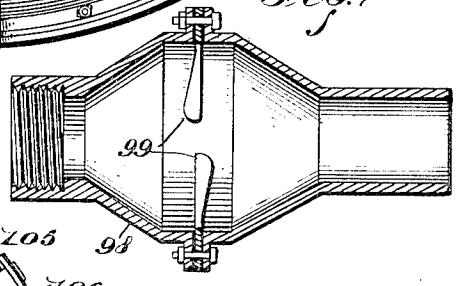
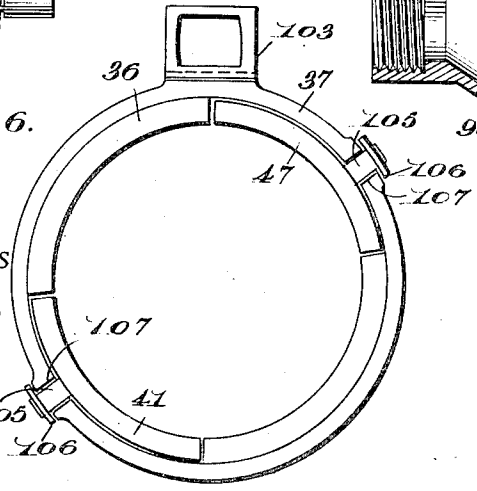


Fig. 6.



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UNITED STATES PATENT OFFICE.

ENOCH SELLBERG, OF WINSLOW, ARIZONA.

ROTARY ENGINE.

Application filed June 14, 1923. Serial No. 645,417.

To all whom it may concern:

Be it known that I, ENOCH SELLBERG, a citizen of the United States, and a resident of Winslow, in the county of Navajo and State of Arizona, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification.

This invention relates to internal combustion engines and is more particularly directed to that type of device known as a rotary engine.

An object of the invention is the provision of a device in which a plurality of cylinders and reciprocating pistons rotate about an axis and a ring eccentrically mounted in respect to said axis and rotatable with said cylinders for controlling reciprocation of the pistons, the cylinders and pistons having a limited rotary movement independent of the movement of the ring.

Another object of the invention is the provision of a device in which a plurality of cylinders and reciprocating pistons rotate about an axis, and a ring eccentrically mounted with respect to the axis for controlling reciprocation of the pistons, with oil receptacles for carrying lubricating oil adapted to rotate simultaneously with respect to each other.

A still further object of the invention is the provision of a rotating cylinder head block in which a plurality of cylinders are radially and removably mounted and locked in position by the respective spark plugs.

Another object of the invention is the provision of a rotary engine having an eccentrically disposed cylinder head block rotatably mounted with a plurality of cylinders radially and removably connected with said head block, said cylinders being in communication with a hollow shaft mounted axially of the head block for supplying the cylinders with a combustible mixture.

Still another object of the invention is the provision of a rotary engine having a cylinder head block mounted for rotation with a plurality of radially and removably disposed cylinders connected therewith, a hollow shaft mounted for rotation with the head block, and a plurality of passages connecting the respective cylinders with the hollow shaft, and a reciprocating valve for controlling communication between the cylinders and the hollow shaft which is adapted to be reciprocated by a track and the rotary movement of the head block.

Other objects and advantages will become apparent during the course of the following description.

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

Figure 1 is a vertical section of my rotary engine taken transversely through the crank shaft.

Figure 2 is a vertical section of the rotary engine in line with the crank shaft.

Figure 3 is a flat view and in detail of the annular tracks for guiding the intake and exhaust valve.

Figure 4 is a side elevation of the engine.

Figure 5 is a longitudinal side view of the valve sleeve.

Figure 6 is a side view in elevation of the track showing the switches.

Figure 7 is a longitudinal section of an extension of the hollow drive shaft which provides a fan.

Referring more particularly to the drawings, 1 and 2 designate the supports for the rotary engine upon which are mounted the spaced circular bearings 3. Upon the supports 1 and 2 are secured spaced housings 4 for roller bearings 5 which carry a hollow crank shaft 6 mounted eccentrically with respect to the circular bearings 3.

Keyed to the shaft 6 is an annular cylinder head block 7 which is mounted for rotation with the shaft 6 and between the bearings 3. Internally threaded recesses 8 are formed in the periphery of the head block and into which are screwed the inner threaded ends of the cylinders 9, 10, 11, 12 and 13.

Located transversely of the head block 7 and arranged in spaced relation around the shaft 6 are a plurality of horizontal passages 14. Each of the cylinders are in communication with a passage through a port 15. Each of the passages 14 are in communication through a port 16 with the passage 17 in the shaft 6. The interior of the passages 14 are recessed to receive sleeves or bushings 18 which are provided with a plurality of openings 19 alined with

the ports 15 and also a plurality of circumferential openings 20 alining with ports 16.

Slidably mounted in each of the bushings 18 is a piston valve 21 which is adapted to be moved sufficiently to the right to open the port 15 and likewise the port 20 to provide open communication between the combustion chamber 22 of each cylinder and the passage 17 in the hollow shaft 6. When the piston valve 21 is moved sufficiently to the left, in Figure 2, the combustion chamber 22 is in open communication through the port 15 with the passage 23 leading to the manifold 24. An exhaust pipe 25 connected with the manifold 24 passes through one of the bearings 3 and to the atmosphere. It will be seen that the exhaust manifold is stationary while a ring 26 connected with the head block 7 engages the inner flange 27 on the exhaust manifold and rotates within said exhaust manifold so that the passages 23 will be always in communication with said manifold. The piston valve 21 is provided with piston rings 28 to prevent the escape of fluid past said piston and I have provided perforations 19 and 20 in the bushing 18 instead of slots whereby the rings 28 are prevented from falling into the ports 15 and 16.

Connected to the piston valve 21 is a valve stem 30 which is slidably mounted in a guide 31 which is removably mounted within the passage 14 by the peripherally threaded flange 32 engaging the threads 33 on the inner wall of the passage 14. The end of T-shaped member on valve stem 30, pointing towards center of engine, works in groove 34 in head 7 to prevent turning of said valve stem.

Upon the outer ends of the stems 30 is formed a T-shaped member 35 adapted to engage grooves forming a track in a ring 36. The ring 36 is mounted in a housing 37 which is rigidly connected with one of the bearings 3 and therefore the rings 36 and the housing 37 are not rotatable while the valve stem 30 and the T-shaped member 35 revolve with the head 7 within the housing for engaging the tracks 38 in the ring 36.

The ring 36 is shown in projection and more in detail in Figure 3 and comprises a groove or track 39 which is formed centrally of the inner and outer walls of the ring 36 so that the T-shaped member 35 engaging the straight portion of the track will remain in an inoperative position and will not cause reciprocation of the piston valve 21. As the T-shaped member passes through the straight portion of the track 39 which is designated as the compression stroke of the piston, the T-shaped member will engage the inner end 40 of a switch 41 and move the same out of position so that the T-shaped member will pass into the "power" track 42. This leaves switch 41 in position to move the next valve to exhaust track. The T-shaped member will move along the straight path 42 until it engages the enlarged end 45 of the switch 44 and moves the same over and permits the T-shaped member to pass into the path 46 which is directed to one side of the medial line to the outer wall of the ring 36 by switch 47. This movement opens communication between chamber 22 and exhaust port 23. This leaves switch 47 in position for compression movement of next valve.

The T-shaped member engages the enlarged end 48 of switch 47 causing switch 47 to be moved over said T-shaped member, then engages stationary cam and is moved through track 49 to central track 39. The T-shaped member then engages switch 50 and is moved over to intake track 52 and engages the enlarged portion 51 of switch 50 moving same over. This leaves switch 50 in position for power stroke of following valve. At the end of the straight portion 52 of the track the track at 53 is directed outwardly towards the medial line 39 of the track and again into compression.

When the T-shaped member enters the exhaust portion 46 of the track, the T-shaped member will be moved towards the outside of the ring 36 and move the stem 30 to the left and likewise the valve 21 in the same direction thereby opening the port 15 and placing the combustion chamber 22 of that cylinder in communication with the exhaust passage 23 and the exhaust manifold 24. The change in direction from the exhaust portion of the track to the intake portion 52 of said track will cause the T-shaped member to move inwardly and towards the right and carry the valve 21 towards the right and open the port 15 to the passage 14 whence the combustion chamber 22 will be placed in communication with the intake passage 17 for supplying a combustible mixture through the cylinders. The straight portions 39 and 42 of the track cause the T-shaped member to remain stationary and maintain the valve 21 in the position which closes the port 15 and thereby permits compression and power strokes of the respective pistons in the cylinders during this time.

It will be seen that the two switches for causing a directional movement of the T-shaped member 35 for producing the compression, power, exhaust and intake strokes play an important part in directing the T-shaped member 35. The upper switch 44 in Figure 6 is shown in Figure 3 as switches 44 and 50. The lower switch 41 in Figure 6 is shown in Figure 3 as switches 41 and 47.

Figure 3 is an actual view of the switches and track from the side next to the engine. While Figure 3 is a distorted view made to show the positions of the two switches during two complete revolutions of the engine and is not an actual cut.

Referring to Figure 3 it will be seen that switch 41 is lined for the straight track 39. This is the position of switch 41 when the cylinder leaves bottom center and starts upward on the compression stroke. After T-shaped member passes through switch 41, switch 41 is left lined for the exhaust track as is shown by 47. That completes the compression cycle.

Switch 44 is seen to be lined for the straight track 39. This is the position of switch 44 when cylinder leaves top center and starts downward on the power stroke. After T-shaped member passes through switch 44 switch 44 is left lined for the intake track as is shown by 50. That completes the power cycle and one revolution of the engine. On the next revolution comes the exhaust and intake cycles. The switches being lined for same by the preceding T-shaped member.

The cylinder leaves the bottom center and starts upward on the exhaust stroke. The T-shaped member is moved to the exhaust track by switch 41, after T-shaped member passes through switch 41 to the exhaust track, switch 41 is left lined for track 39. This completes the exhaust cycle.

The cylinder leaves the top center and starts downward on the intake stroke. The T-shaped member is moved to the intake track by switch 44 as is shown by 50. After T-shaped member passes through switch 44 to the intake track switch 44 is left lined for the straight track 39. This completes the intake cycle and two complete revolutions of the engine.

Mounted for rotation upon opposite sides of the cylinder head block 7 and on the stationary bearings 3 are frames 59 and 60. Ball bearings 61 on the stationary bearings 3 support the frames 59 and 60, said frames comprise rings 62 mounted on the bearings 31, radiating legs 63 and angle iron segments 97 secured to the ends of the legs 63. Secured to the outer end of the spaced legs are fins 65 which operate as fans for causing a blast of air to circulate around the engine when the same is in operation and aid in cooling said engine.

Secured to the peripheries of the segments 97 is a band 66 forming a closure for an oil receptacle 67. A pair of annular rings 68 and 69 are secured to the opposite segments 97 by means of bolts 70. The upper ends of the rings are bent inwardly as shown at 71 and then downwardly and upwardly as shown at 72 and 73, respectively, to form a track and in which is mounted the side walls 74 of a closure for the oil receptacle 67. The members 68 and 69 previously described, form the side walls of the oil receptacle. Said receptacle is adapted to carry a lubricating oil for lubricating the moving parts of the engine. The closure is provided with a top 75 having openings adjacent the respective cylinders to receive said cylinders. A strap 76 embraces the respective cylinders and is adapted for locking the closure in position.

A wrist pin 77 is rigidly secured in position within the open end of the reciprocating pistons 78 mounted in each cylinder. Upon each wrist pin is rotatably mounted a roller 79 which has a ball bearing 80 embracing its periphery and which is adapted to be engaged by the inner periphery of an annular ring 81 which is secured to the inner wall of the annular band 66 and centrally of the oil receptacle 67. Mounted upon each wrist pin is a strap which engages an arcuately shaped slot formed in the ring 81. The strap 83 engages the slot 84, strap 85, engages slot 86, strap 87 engages slot 88, strap 89 engages slot 90, and strap 91 engages slot 92. The respective rollers mounted upon each wrist pin is adapted to engage the inner periphery 93 of the ring 81 by the straps and the centrifugal force of the rotating piston causing reciprocation of the respective pistons through a differential movement caused by the different centers of the ring 81 and the cylinders when the ring 81 and the cylinders 9 and 13 inclusive are rotated simultaneously.

Fins 94 formed on the outer walls of the respective cylinders and fins 95 on the cylinder head block 7 cooperate to cool said cylinder.

Plugs 96 screwed into the threaded openings in the annular band 66 provide means for refilling or discharging lubricating oil from the receptacle 67.

Arcuately shaped annular angle irons 97 are bolted to the side walls 68 and 69 of the oil receptacle for reinforcing the connection between the band 66 and said side walls.

Upon the hollow portion of the shaft 6 is secured an enlargement 98 which is provided with fan blades 99 projecting inwardly from the walls of said enlargement and provides a means for aiding in driving the combustion fluid through the passage 17 in the shaft from the usual carbureter.

Screwed into alined threaded passages in each cylinder and the sockets 8 formed in the head block 7 is a spark plug 100 which is adapted to lock each of the cylinders against rotation and dislocation from its socket. The outer end of the spark plug is provided with a contact 101 which is adapted to engage a stationary contact 102. The contact 102 is insulated from a bracket 103 which is secured to the housing 37 for the

track 36. As the cylinders rotate and the spark plug engages the contact 102, the gases are ignited within the respective cylinders.

The operation of my device is as follows:

Gases are taken in on the outward movement of the pistons and are compressed upon the following inward movement. Gases are ignited by the rotating spark plug engaging the respective contact 102 and this contact is made at the completion of each compression movement of the piston when the piston is forced outwardly upon the power stroke. Leverage is imparted to the cylinder head shaft 6 by reason of the eccentric mounting of the shaft 6 with respect to the mounting of the frames 59 and 60 which are connected to the respective pistons. The gases are exhausted at the end of the power stroke and when the piston valve 21 is moved to the left and the compression chamber 22 is in communication with the exhaust passages 23. As shown more particularly in Figure 3, the tracks are so arranged as to cause the piston 21 to be moved to the right at a point adjacent the end of the exhaust stroke to permit fresh gases to be drawn into the combustion chamber 22 and then compressed and fired.

The cylinder head block and likewise the cylinders connected with said block rotate simultaneously with the frames 59 and 60 and the ring 81. At slow speed the U-shaped straps which connect with the respective pistons to the ring 81 hold the pistons in proper position but at high speed the centrifugal force retains the pistons against the retaining ring 81 relieving the U-shaped strap of all strain. While the cylinders rotate simultaneously with the frames 59 and 60 and the ring 81, a differential movement between said ring and the cylinders causes the pistons to be reciprocated within their respective cylinders as the rollers 79 engage the inner periphery of the ring 81. The cylinders, as has been described, are provided with diametrically disposed slots 104 whereby the ring 81 is adapted to move in and out of said slots and thereby permitting a longer cylinder to be used. Slotting of the cylinder also limits the width of the retaining ring. The side walls 74 of the closure for the oil receptacle 67 reciprocate in the tracks formed by the return bands 73 of the inner wall 72 to form an extension of the side of the oil receptacle as shown more particularly in Figure 2.

The varied positions of the revolving pistons to the different strokes is illustrated by Figure 1. Cylinder 9 with the strap 83 located centrally of the slot 84, maintains the piston at the inner end of the stroke and since the ring 81 and the cylinders of the pistons rotate simultaneously the movement of the pistons in their respective cylinders are controlled. Differential movement is permitted between the ring 81 and the rotating cylinders by the loose connection between the strap and the ring 81 through their respective slots.

What I claim is:

1. In a rotary engine, a hollow shaft mounted for rotation, a cylinder head block keyed to said shaft, cylinders connected radially with said block, said head block being provided with a plurality of passages connecting the hollow shaft with the respective cylinders, and means controlling said passages, pistons in said cylinders, means mounted for rotation eccentrically relative to the shaft, and means connecting the last mentioned means to the pistons for permitting relative movement between said last mentioned means and the cylinders and for causing simultaneous rotation of said means with said cylinders.

2. In a rotary engine, a shaft hollow at one end and mounted for rotation, a cylinder head block keyed to the solid portion of said shaft, cylinders connected radially with said block, an exhaust manifold, said head block being provided with a plurality of passages, connecting the cylinders with the hollow shaft, and a plurality of passages connecting the cylinders with the exhaust manifold, a reciprocating means for periodically controlling the passages to the hollow shaft and to the exhaust manifold.

3. In a rotary engine, a hollow shaft mounted for rotation, a cylinder head block keyed to said shaft, cylinders connected radially with said block, an exhaust manifold, said head block being provided with a plurality of passages connecting the cylinders with the hollow shaft, and a plurality of passages connecting the cylinder with the exhaust manifold, a valve for controlling the passages for the hollow shaft and to the exhaust manifold, a valve stem connected with the valve and provided with a T-shaped member at its outer end, a rigidly mounted ring provided with a distorted track on its inner periphery adapted to be engaged by the T-shaped member for causing reciprocation of the valve.

4. In a rotary engine, a hollow shaft mounted for rotation, a cylinder head block keyed to said shaft, cylinders connected radially with said block, an exhaust manifold, said head block being provided with a plurality of passages connecting the cylinders with the hollow shaft, and a plurality of passages connecting the cylinder with the exhaust manifold, a valve for controlling the passages to the hollow shaft and to the exhaust manifold, a valve stem connected with the valve and provided with a T-shaped member at its outer end, a rigidly mounted ring provided with a track formed on its inner periphery and adapted to

be engaged by the T-shaped member, said track being formed for a portion of its length in alinement with a medial of the ring, the remainder of the track being formed for a portion of its length upon one side of the medial line while the remaining portion is formed upon the opposite side of the medial line and then merges into the straight line track.

5. In a rotary engine, a hollow shaft mounted for rotation, a cylinder head block keyed to said shaft, cylinders connected radially with said block, an exhaust manifold said head block being provided with a plurality of passages, connecting the cylinders with the hollow shaft, and a plurality of passages connecting the cylinder with the exhaust manifold, a valve for controlling the passages to the hollow shaft and to the exhaust manifold, a valve stem connected with the valve and provided with a T-shaped member at its outer end, a rigidly mounted ring provided with a distorted track on its inner periphery adapted to be engaged by the T-shaped member for causing reciprocation of the valve, said valve and stem being carried by the head block and rotated therewith, and means for guiding the stem in its reciprocating movement.

6. In a rotary engine, a hollow shaft mounted for rotation, a cylinder head block keyed to said shaft, cylinders connected radially with said block, an exhaust manifold, said head block being provided with a plurality of passages connecting the cylinders with the hollow shaft, and a plurality of passages connecting the cylinder with the exhaust manifold, a valve for controlling the passages to the hollow shaft and to the exhaust manifold, a valve stem connected with the valve and provided with a T-shaped member at its outer end, a rigidly mounted ring provided with a track formed on its inner periphery and adapted to be engaged by the T-shaped member, said track being formed for a portion of its length in alinement with a medial of the ring, the remainder of the track being formed for a portion of its length upon one side of the medial line while the remaining portion is formed upon the opposite side of the medial line and then merges into the straight line track, and switches pivotally mounted on the ring in the path of the moving T-shaped member for shifting said member from the straight portions of the track to portions of the track which lie upon opposite sides of the straight track.

7. In a rotary engine, rigidly mounted bearings, a hollow shaft mounted for rotation in said bearings, a suction fan mounted in the hollow shaft, a cylinder head block carrying cylinders keyed to said shaft, said cylinder block being provided with valve passages connecting the hollow shaft with the combustion chambers of the cylinders; said hollow shaft forming an intake conduit for a combustible mixture from a carbureter, and a suction fan mounted in the hollow shaft for aiding in delivering the mixture to the combustion chambers of the cylinders.

8. In a rotary engine, a hollow shaft mounted for rotation, a cylinder head block keyed to said shaft, cylinders connected radially with said block, an exhaust manifold, said head block being provided with a plurality of passages connecting the cylinders with the hollow shaft, and a plurality of passages connecting the cylinder with the exhaust manifold, a valve for controlling the passages for the hollow shaft and to the exhaust manifold, a rigidly mounted ring provided with a distorted track on its periphery said valve being provided with means adapted to engage the distorted track for causing reciprocation of the valve.

9. In a rotary engine, a hollow shaft mounted for rotation, a cylinder head block keyed to said shaft, cylinders connected radially with said block, an exhaust manifold, said head block being provided with a plurality of passages connecting the cylinders with the hollow shaft, and a plurality of passages connecting the cylinder with the exhaust manifold, a valve for controlling the passages for the hollow shaft and to the exhaust manifold, a rigidly mounted ring provided with a distorted track on its periphery, said valve being provided with means adapted to engage the distorted track for causing reciprocation of the valve, said track being formed for a portion of its length in alinement with a medial of the ring, the remainder of the track being formed for a portion of its length on one side of the medial line, while the remaining portion is formed upon the opposite side of the medial line and then merging into the straight line track.

10. In a rotary engine, a hollow shaft mounted for rotation, a cylinder head block keyed to said shaft, cylinders connected with said block, an exhaust manifold, said block being provided with a plurality of passages connecting the cylinders with the hollow shaft and a plurality of passages connecting the cylinders with the exhaust manifold, said block being provided with a valve chamber, a reciprocating valve, a stem connected to the valve and provided with a radially projecting lug, the lugs and stem adapted to be revolved, and stationary means engaging the lugs for causing reciprocation of the valve.

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