MOTORS

Filed March 20, 1964

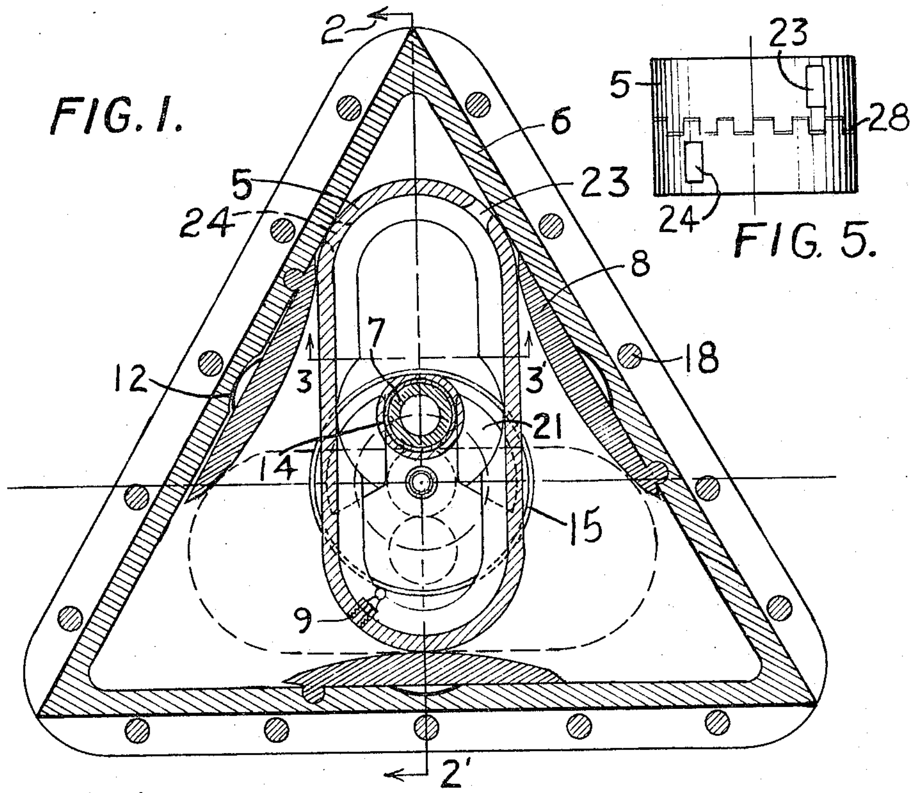

FIG. 1.

FIG. 5.

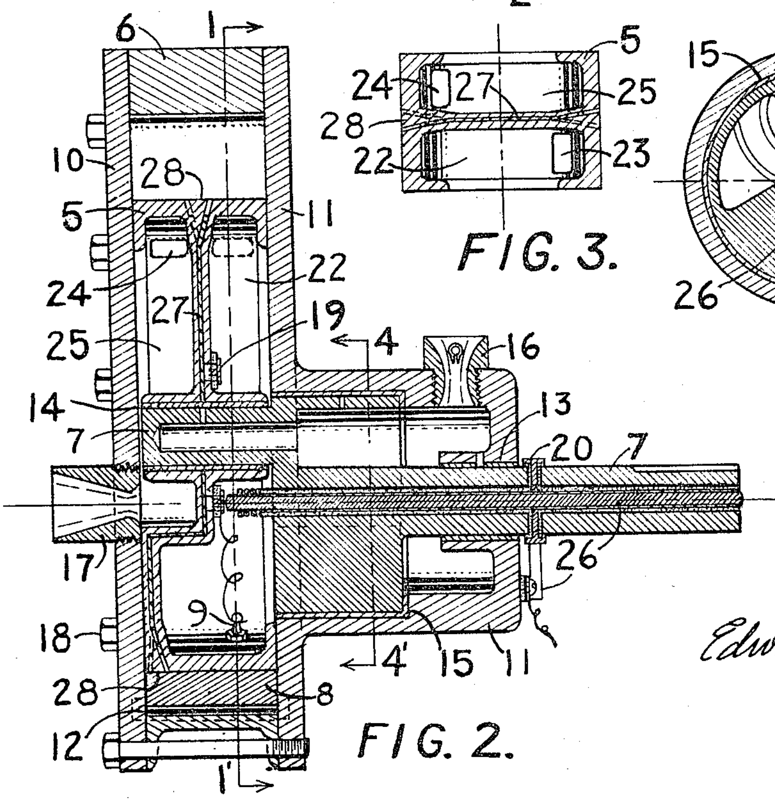

FIG. 3.

FIG. 2.

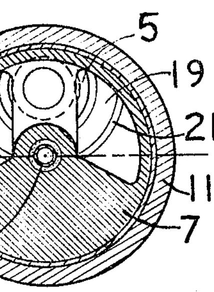

FIG. 4.

INVENTOR

Edwin O. Winans

United States Patent Office

3,301,228
Patented Jan. 31, 1967

3,301,228
MOTORS

Edwin O. Winans, 4812 Edgefield Road,
Bethesda, Md. 20014

Filed Mar. 20, 1964, Ser. No. 353,430
3 Claims. (Cl. 123—8)

This invention relates to rotary piston motors and has relation more particularly to novel features applicable to motors of the type described in U.S. Patent No. 2,162,771, and it is an object of my invention to provide a motor of few parts, easily constructed, assembled, operated and maintained.

It also an object of the invention to provide a motor of this kind which requires but little space in which to perform its duty as compared with other engines of similar working volume, generally called piston displacement.

It is also an object of this invention to eliminate conventional valves (poppet, slide or rotary), which are opened and closed against, or across, pressure differences, and eliminate associated timing cams and mechanisms.

The invention consists in the details of construction and in the combination and arrangement of the several parts of my improved motor, whereby certain important advantages are attained and the device rendered simpler, less expensive and otherwise more convenient and advantageous for use, as will hereinafter be more fully set forth.

The novel features of my invention will hereinafter be definitely claimed.

The following is a description of same with reference to the accompanying drawing, wherein:

FIGURE 1 is a sectional view partly in section, and partly in elevation of a motor having the features embodied in my invention, the section being along line **1–1′** of FIGURE 2;

FIGURE 2 is a sectional view taken on the line **2–2′** of FIGURE 1;

FIGURE 3 is a sectional view of the rotary piston taken on the line **3–3′** of FIGURE 1;

FIGURE 4 is a fragmentary view partly in section and partly in elevation taken on line **4–4′** of FIGURE 2;

FIGURE 5 is a plan view of the rotary piston as it is positioned in FIGURE 1.

As disclosed in the accompanying drawing the casing of my improved motor is made in three parts, the front plate **11**, the rear plate **10**, and the triangularly disposed walls **6**. The end plates being substantially flat and in parallelism and spaced apart by the walls, which are equally placed around the axial center of the casing, by a distance substantially equal to the axial width of the piston **5**, and are held together by bolts **18**. Three compression-seal-piston-guide inserts **8** are attached to the inside of the triangular casing walls **6** at their centers. These inserts **8** are hypocycloidally curved on their inward faces and flat on their backs except for hinge-pin lugs near one end which are recessed in similarly shaped grooves in the casing walls **6** and which are spring supported by compression springs **12** toward their other ends. They have a flap like contact with the piston's periphery and have a narrowly limited range of motion.

The oblong curvalinear, or race-track shaped, piston **5** is in contact with the three compression-seal-piston-guide inserts **8** at all times. The working volumes, or compression chambers, are the spaces between the piston **5** and the three corners of the triangular casing **6**. The intake manifold **22** is inside the front side of piston **5**, and the exhaust manifold **25** is in the back side of piston **5**, and are separated from each other by a supporting partition substantially perpendicular to the axis of rotation. This partition has a central layer consisting of a compressible gasket or spring diaphragm **27** which joins the two parts of piston **5** together in its central area. The edges of the joint have interlacing teeth **28** which slide together or apart as the gasket **27** is compressed or released. This provides gas tight contact of the piston with the end plates **10** and **11**, assisted by the compression pressures acting between the teeth's tips. The intake port **23** and exhaust port **24** located in the oval piston's periphery open directly into the intake and exhaust manifolds **22** and **25** within pistons **5** and are never closed. There are no counter ports or passages that need closing across which pressure differences occur which need to be shut off by valve action. The intake port **23**, exhaust port **24** and ignition plug **9** operate in proper sequence by reason of their pertinent location in the piston's periphery as it rotates in-to and out-of each compression chamber in turn. No other timing is required. Electrical contact with the ignition plug **9** is by means of suitable slip rings **19** and **20** and brushes **26**, or other like means. The piston **5** is eccentrically mounted on crankshaft **7**. The piston's proportions are substantially 2 times the crank radius thick, 3 times wide and 7 times long.

FIGURE 1 shows the piston **5** just completing the exhaust stroke and beginning the intake stroke of a four stroke cycle operation in the top compression chamber, and one-third along in a compression stroke in the lower right compression chamber, and two-thirds along in a power stroke in the lower left compression chamber. The rotation of the crankshaft **7** is clockwise and of the piston **5** counterclockwise at half the speed. A half turn, of 180°, of the crankshaft **7** constitutes a ¼ cycle, or stroke, for each compression chamber. The alternate position for the piston at the bottom of a stroke for the top compression chamber is shown by a dash outline in FIGURE 1. The driveshaft bushing, crank-piston bushing and crank disc bushing are numbered **13**, **14** and **15**.

The flow of the fuel-oil-air mixture is from the carburetor **16** through open passages in the crank disc **7** to the intake manifold **22** in front side of the oval rotary piston **5** and through the intake port **23** into the compression chambers where it is compressed and fired, and thence out through the exhaust port **24** through the exhaust manifold **25** in the other, or back, side of the piston and on out through the exhaust nozzle **17**. The exhaust nozzle could also be made to serve as another driveshaft. For increased jet action the exhaust port would be located in the piston's periphery where it would be exposed in the compression chambers at an earlier point in the cycle of operation before the power strokes are fully completed. The gyroscopic forces due to the rotating piston and crankshaft may be neutralized by suitable weight distribution between them which can also counterbalance the piston.

Cooling is by means of suitable cooling fins, or water jacket not illustrated in the drawing.

From the foregoing description it is thought to be obvious that a motor containing the features constituting my invention is particularly well adapted to ease of manufacture, assembly, operation and maintenance; and it will also be obvious that my invention is susceptible of some change and modification without departing from the principles and spirit thereof, and for that reason I do not wish to be understood as limiting myself to the precise arrangement and formation of the several parts herein shown in carrying out my invention in practice except as hereinafter claimed.

I claim:

1. In an engine of the type described, a casing defining a flat chamber in the form of an equilateral triangle comprising triangular end plates, spaced apart along an axis normal to said plates and passing through the center of the triangles, connecting walls joining said end plates along the sides of the triangles, a crankshaft disposed along said axis and carrying an eccentric, a piston in said casing having an oval curvilinear periphery, said piston being rotatably journalled on said eccentric about an axis normal to its longer dimension at the mid-point of said dimension such that said piston can rotate about its own axis as said piston axis rotates about said casing axis, and a piston guide insert mounted in the center of each wall by a spring responsive hinge mounting, said insert having a hypocycloidal curved surface facing said casing axis and being swingable to remain in continuous engagement with said piston periphery, said piston, casing and inserts cooperating to form a plurality of chambers which vary in volume as said piston rotated, and inlet and outlet means communicating with said chambers.

2. In an engine of the type described, a casing defining a flat chamber in the form of an equilateral triangle comprising triangular end plates, spaced apart along an axis normal to said plates and passing through the center of the triangles, connecting walls joining said end plates along the sides of the triangles, a crankshaft disposed along said axis and carrying an eccentric, a piston in said casing having an oval curvilinear periphery, said piston being rotatably journalled on said eccentric about an axis normal to its longer dimension at the mid-point of said dimension such that said piston can rotate about its own axis as said piston axis rotates about said casing axis, and a piston guide insert mounted in the center of each wall by a spring responsive hinge mounting, said insert having a hypocycloidal curved surface facing said casing axis and being swingable to remain in continuous engagement with said piston periphery, said piston divided into two axially moveable parts which are joined together by interlacing tapered teeth around the edges of the joint and separated by an elastic gasket which extends into the spaces between the teeth, said piston, casing and inserts cooperating to form a plurality of chambers which vary in volume as said piston rotates, and inlet and outlet means communicating with said chambers.

3. In an engine of the type described, a casing defining a flat chamber in the form of an equilateral triangle

comprising triangular end plates, spaced apart along an axis normal to said plates and passing through the center of the triangles, connecting walls joining said end plates along the sides of the triangles, a crankshaft disposed along said axis and carrying an eccentric, a piston in said casing having an oval curvilinear periphery, said piston being rotatably journalled on said eccentric about an axis normal to its longer dimension at the mid-point of said dimension such that said piston can rotate about its own axis as said piston axis rotates about said casinig axis, and a piston guide insert mounted in the center of each wall by a spring responsive hinge mounting, said insert having a hypocycloidal curved surface facing said casing axis and being swingable to remain in continuous engagement with said piston periphery, said piston having within itself an intake manifold which preheats the air as it cools the piston before admission into the combustion chambers, said piston, casing and inserts cooperating to form a plurality of chambers which vary in volume as said piston rotates, and inlet and outlet means communicating with said chambers.

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MARK NEWMAN, *Primary Examiner.*

F. T. SADLER, *Assistant Examiner.*