# United States Patent [19]

**Ackerman**

[11] **3,893,483**

[45] **July 8, 1975**


## [54] ROTARY VALVE TRAIN


[76] Inventor: **Timothy Ackerman,** Main St., Centerbrook, Conn. 06409



[22] Filed: **Jan. 4, 1974**

[21] Appl. No.: **430,904**

[52] **U.S. Cl.**..... **137/625.21;** 123/190 A; 123/190 E

[51] **Int. Cl.**..... **F01l 7/00**

[58] **Field of Search**..... 123/190 R, 190 A, 190 D, 123/190 E; 137/625.21, 625.22, 625.23



[56] **References Cited**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 1,273,433 | 7/1918 | Wehr | 123/190 A |
| 1,486,175 | 3/1924 | Wilson | 123/190 A |
| 1,486,954 | 3/1924 | Dugger | 123/190 A |
| 1,515,052 | 11/1924 | Johnson | 123/190 A |
| 1,578,111 | 3/1926 | Church | 123/190 A |
| 1,787,649 | 1/1931 | Wehr | 123/190 E |
| 3,547,094 | 12/1970 | Yasuda | 123/190 A |

FOREIGN PATENTS OR APPLICATIONS

| | | | |
|---|---|---|---|
| 842,424 | 6/1952 | Germany | 123/190 A |



*Primary Examiner*—Charles J. Myhre

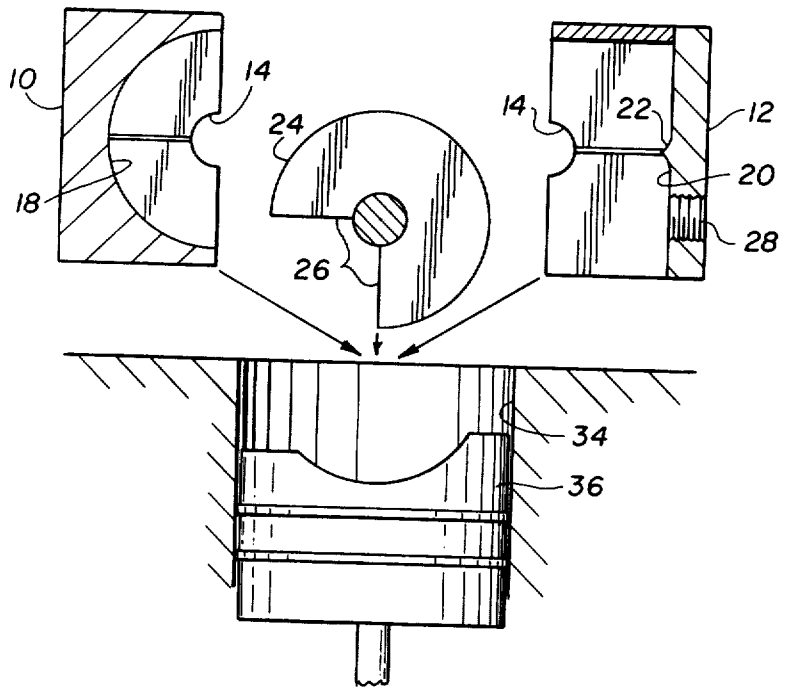
*Assistant Examiner*—Daniel J. O'Connor



[57] **ABSTRACT**

A rotary valve train employing an elongated block with an axial bore and a shaft disposed in the bore and rotatable about its axis. The block contains a plurality of longitudinally spaced recesses centered on the bore and extending at right angles. Each recess has a first half defining a semicircle and a second half defining a rectangle. A separate circular disc centered on, secured to and rotatable with the shaft is disposed in each recess. Each disc has a quadrant removed. Each recess is ported. Each second half recess has a centrally disposed arm extending radially toward the shaft and disposed in sealing engagement with the outer periphery of the body of the disc.


**4 Claims, 4 Drawing Figures**



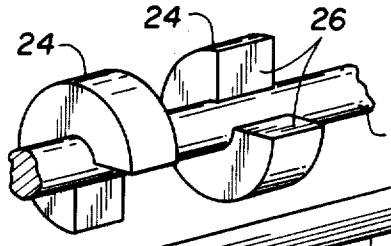



FIG.1




FIG.2

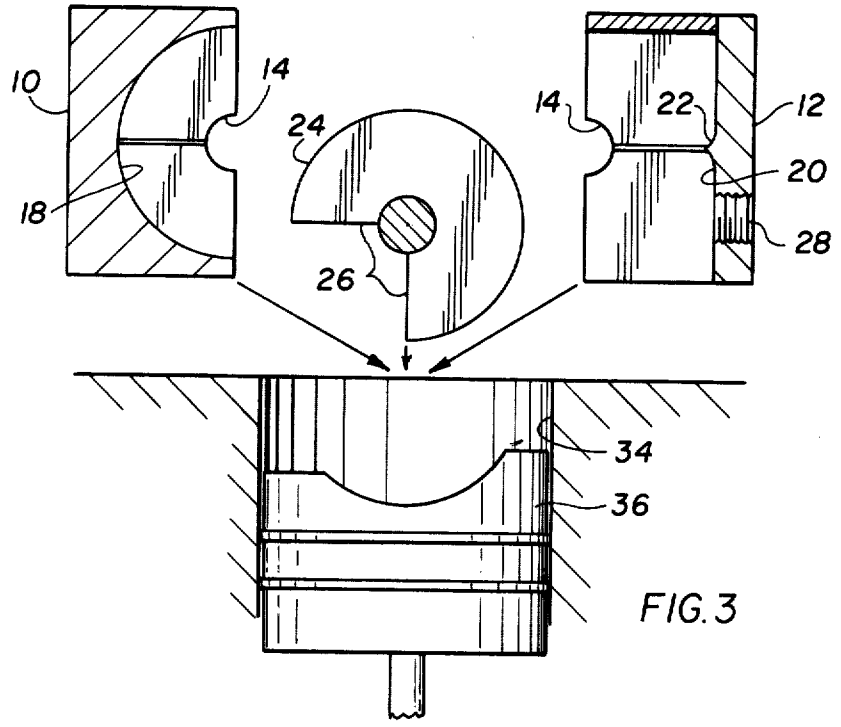



FIG.3

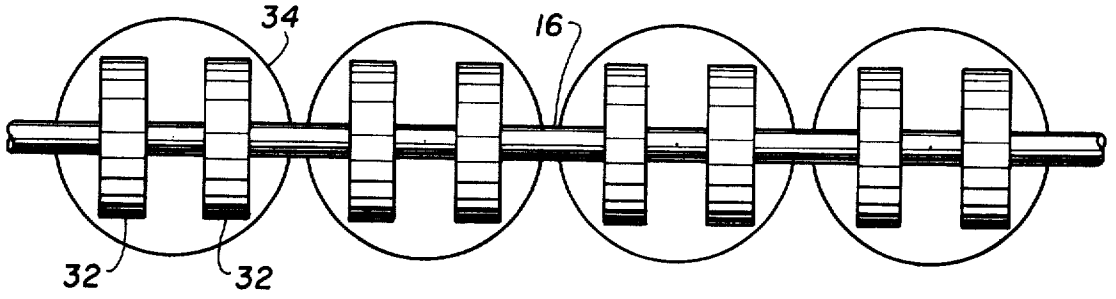



FIG.4

# ROTARY VALVE TRAIN

## SUMMARY OF THE INVENTION

This invention is directed toward a rotary valve train which can be substituted for a conventional overhead valve train in an internal combustion engine.

The rotary valve train employs an elongated block with an axial bore and a shaft disposed in the bore and rotatable about its axis. The block contains a plurality of longitudinally spaced recesses centered on the bore and extending at right angles thereto. Each recess, which is ported, has a first half section defining a semicircle and a second half section defining a rectangle. A separate circular disc having a quadrant removed is centered on, secured to and rotatable with the shaft and is rotatably disposed in the corresponding recess.

Each combination of recess and disc constitutes a valve. The timing is controlled by carefully spacing the missing quadrants of the discs relative to each other. The shaft is driven by a chain off the crank shaft as is a cam shaft in a conventional engine.

The rotary valve train thus substitutes a smooth circular motion which is highly efficient for the lower efficiency conventional up and down motion and contains many fewer parts.

## BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a perspective view of shaft with discs as used in the invention;

FIG. 2 is a perspective view of a portion of the valve block as used in the invention;

FIG. 3 is an exploded view in cross section of the parts used in the invention; and

FIG. 4 is a top view of the composite valve train.

## DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Referring now to FIGS. **1–4,** mating rectangular blocks **10** and **12** define an elongated block with a centrally disposed axial bore **14.** A shaft **16** rotated about its axis by a chain off the crank shaft of the engine employing the invention is disposed in the bore.

A plurality of recesses which are longitudinally spaced are disposed in the block, centered on the shaft and extend at right angles to the shaft. Each recess has a first half section **18** defining a semicircle and a second half section **20** defining a rectangle. The center of the section has a stub or arm **22** extending radially inward at right angles toward the shaft.

The shaft carries a plurality of longitudinally spaced circular discs **24** centered on the shaft, secured thereto and rotatable therewith. Each disc has a quadrant **26** cut away. A separate disc is disposed in each recess and the circular peripheral surface engages the arm **22.** Each section **20** has a port **28.**



Each combination of recess and disc constitutes a separate valve **32.** Two valves, an intake valve and an exhaust valve are disposed in corresponding cylinder housings **34,** each containing cylinder **36.** The valves are operated by shaft **16** as described. The timing is adjusted by varying the position of the quadrants **26.** As shown in FIG. **1,** the relative positions of the quadrants of a pair of valves, one intake, the other exhaust, are adjusted for a 180° separation. As is shown in FIG. **3,** the two blocks are placed together, surrounding the shaft and the discs thereon. The two blocks are disposed directly above the cylinder, forming a cylinder head. Considering the disc shown in the drawing as an intake valve, air-fuel mixture is sucked into port **28** into the rectangular half section only so long as one of the faces of the cutaway quadrant is between the arm **22** on the rectangular half section and a downwardly directed vertical line. The corresponding exhaust valve operates in a similar manner.

While I have described my invention with particular reference to the drawings, such is not to be considered as limiting its actual scope.

Having thus described this invention, what is asserted as new is:

**1.** A rotary valve train comprising:

an elongated block having an axial bore and a plurality of longitudinally spaced recesses centered on the bore and extending outward at right angles, each recess being ported and having first and second halves, the first half being semi-circular, the second half being rectangular;

an elongated shaft rotatable about its axis disposed in the bore; and

a like plurality of circular discs, each centered on and secured to the shaft and rotated therewith, the discs being longitudinally spaced, each disc being disposed in a corresponding recess and rotatable therein, each disc having a cut out portion defining a circular sector.

**2.** The train of claim **1** wherein the disc cut-out portions are angularly separated one from another.

**3.** The train of claim **2** wherein each cut-out portion defines a quadrant.

**4.** The train of claim **3** wherein each second half has an arm extending centrally and radially inward, the outer circular periphery of the corresponding disc being in sealing engagement with the arm.

* * * * *