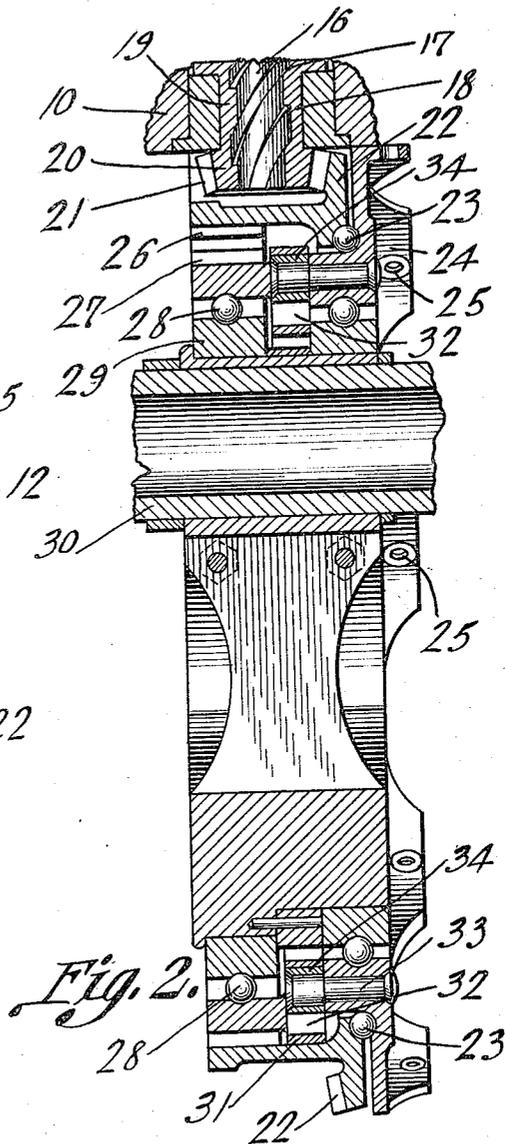
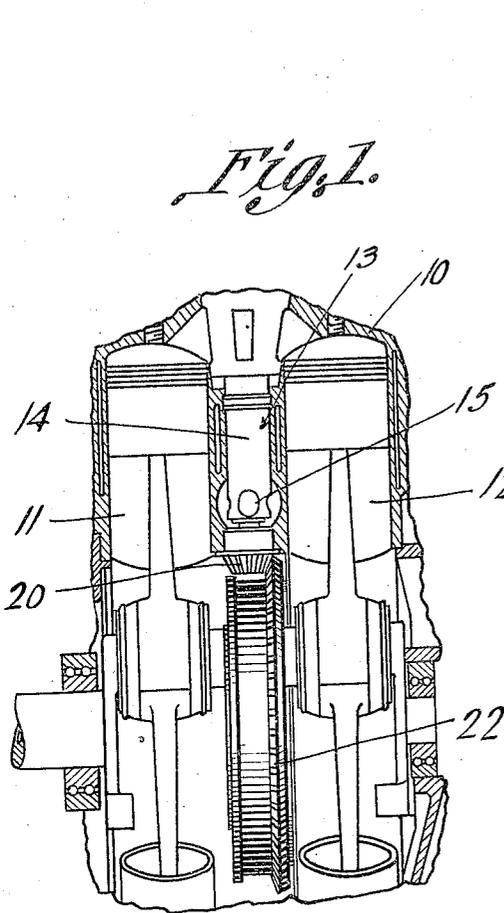


M. A. TIPS.
VALVE OPERATING MECHANISM.
APPLICATION FILED FEB. 11, 1918.

Patented June 10, 1919.
2 SHEETS—SHEET 1.

1,306,036.



Maurice A. Tips
Inventor

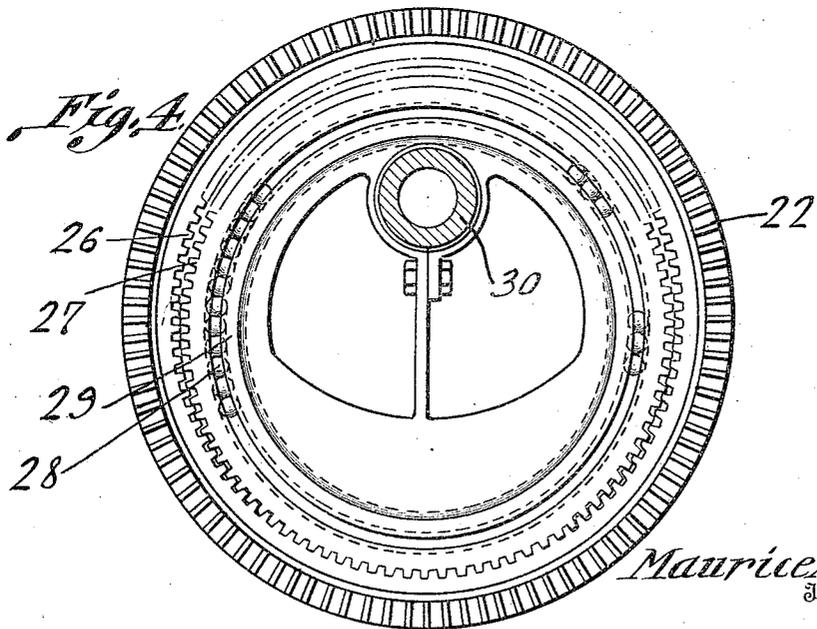
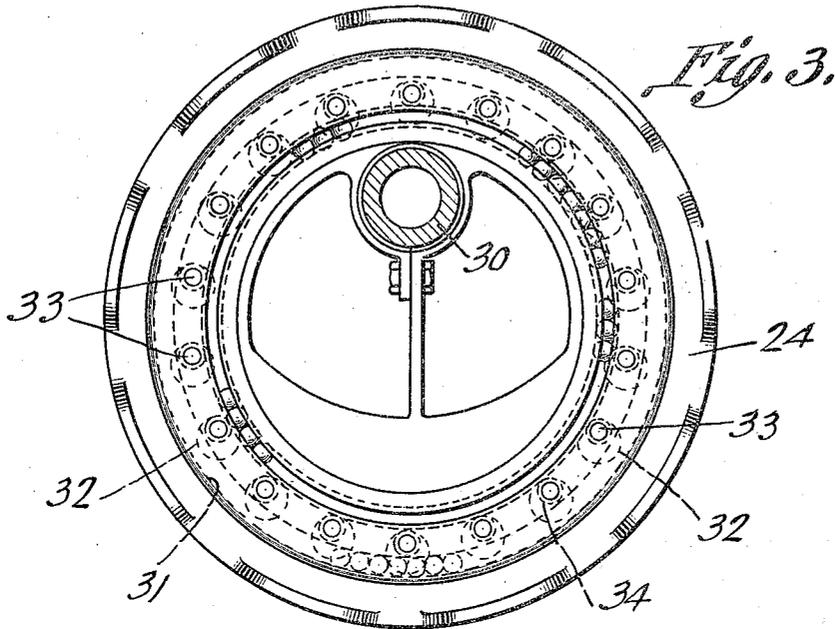
By *Norman J. Whitaker*
his Attorney

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UNITED STATES PATENT OFFICE.

MAURICE A. TIPS, OF WOONSOCKET, RHODE ISLAND, ASSIGNOR TO TIPS AERO MOTOR COMPANY, INC., OF WOONSOCKET, RHODE ISLAND, A CORPORATION OF RHODE ISLAND.

VALVE-OPERATING MECHANISM.

1,306,036.

Specification of Letters Patent.

Patented June 10, 1919.

Original application filed October 11, 1917, Serial No. 195,898. Divided and this application filed February 11, 1918. Serial No. 216,603.

To all whom it may concern:

Be it known that I, MAURICE A. TIPS, a subject of the King of Belgium, and a resident of Woonsocket, in the county of Providence and State of Rhode Island, have invented new and useful Improvements in Valve-Operating Mechanism, of which the following is a specification.

This invention relates to valve operating mechanism and has particular reference to valve operating mechanism designed to be used particularly in connection with internal combustion engines of the rotating cylinder type.

An important object of the invention is to provide in a mechanism of the above named character a means whereby the desired differentiation between the rotating driving elements and the rotating driven elements employed therein may be acquired.

A further object of the invention is to provide in a mechanism of the above named character a means whereby a constant ratio of the several rotating elements employed may be maintained regardless of the speed at which the several elements may be rotated.

Another object of the invention is to provide in a mechanism of the above named character a means whereby the operation of the mechanism as a whole will not be obstructed should certain elements employed therein lose their original characteristics or identity in certain particulars.

A further object of the invention is to provide in a mechanism of the above named character a means whereby all strain of rotation upon the several rotating elements employed may be eliminated to the greatest possible degree.

Another object of the invention is to provide in a mechanism of the above named character a means whereby the structure may be easily assembled or disassembled with respect to the engine of the particular type with which the mechanism is designed to be used.

Another object of the invention is to provide a mechanism which is strong, durable, effective, reliable and accurate in operation.

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

This application is a division of my application filed October 11, 1917 for internal combustion engine, Serial No. 195,898.

In the accompanying drawings, forming a part of this specification and in which like numerals are employed to designate like parts through the same,

Figure 1 is a fragmental sectional view of an internal combustion engine embodying my invention,

Fig. 2 is an enlarged detail sectional view of the mechanism embodying my invention,

Fig. 3 is a side elevation of the mechanism embodying my invention, and,

Fig. 4 is an opposite side elevation to that shown in Fig. 3 of the mechanism embodying my invention.

In the drawings, wherein for the purpose of illustration is shown a preferred form of my invention, the numeral 10 indicates a cylinder block or casting of the rotating type provided with a plurality of cylinders arranged in pairs, a pair of which is shown in Fig. 1 and indicated by the numerals 11 and 12. Between each pair of cylinders there is arranged a rotary valve indicated as a whole by the numeral 13. This valve comprises an elongated hollow portion 14, one end of which is provided with a plurality of openings 15 and carries a stem 16 preferably formed integral therewith and provided with screw-threads indicated by the numeral 17. The stem 16 is adapted to receive thereupon a sleeve 18 provided with interior screw-threads 19 adapted to engage and co-act with the screw-threads 17 carried upon the stem 16. The sleeve 18 carries a bevel gear 20 preferably formed integral therewith and provided with a plurality of teeth 21 preferably sixteen in number.

The gear 20 is adapted to mesh with a master gear 22 which is rotatably mounted on a large annular ball-bearing 23 carried by a bearing plate 24 which in turn is fixed to the cylinder block 10 by means of suitable bolts or the like not shown passed through openings 25 carried by the plate 24. The master gear 22 carries an internal gear 26 preferably formed integral therewith, which internal gear possesses preferably one hundred twenty-eight teeth and into which meshes an external gear 27 of slightly

smaller pitch and possessing preferably one hundred twenty-four teeth. This external gear is mounted upon an annular ball-bearing 28 which is mounted upon an eccentric member 29 carried by the crank shaft 30, the eccentricity of the member 27 being approximately equal to the pitch of the teeth of the external gear 27. The external gear 27 is provided with a flange 31 arranged substantially at right-angles thereto and provided with a series of circular openings 32 fitting loosely upon a series of pins 33 which are suitably affixed to the bearing plate 24 and provided at one end thereof with roller bearings 34. As a result of the projection of the pins 33 into the openings 32 the external gear 27 is forced to rotate in synchronism with the cylinder block 10 but at the same time being allowed to float upon the pins 33.

The operation of the mechanism is as follows: For each rotation of the eccentric 29 with respect to the cylinder block 10, the external gear 27 will be rolled once around the interior of the internal gear 26. Therefore, as the external gear possesses one hundred twenty-four teeth and cannot rotate relative to the cylinder block 10 and the internal gear possesses one hundred twenty-eight teeth and is free to rotate relative to the cylinder block 10, such action will cause the master gear 22 to advance four teeth, which action will rotate the valve 13 through 90°, the bevel gear 20 of each valve having sixteen teeth and the master bevel gear 22 having one hundred twenty-eight teeth. It will therefore be seen that four relative revolutions between the crank shaft 30 and the cylinder block 10 will cause the valve 13 to make one complete rotation, thereby causing the engine to function on the four-cycle stroke, as each valve possesses four ports through two of which gaseous mixture is supplied to the cylinders while

the remaining two permit the escape of exhaust gases therefrom.

It is to be understood that the form of my invention herewith shown and described is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claim.

Having thus described my invention, what I claim as new and desire to secure and protect by Letters Patent of the United States, is:

In a prime mover, the combination with a cylinder block having cylinders arranged in pairs and a crank shaft, of rotating valves interposed between said cylinders, gears carried by said valves, a bearing plate secured to said cylinder block, a valve operating element rotatably mounted upon said bearing plate, said valve operating element being provided with an external gear arranged perpendicularly with respect to said valve operating element and meshing with the gear carried by said valve, an internal gear arranged perpendicularly with respect to said external gear; means to rotate said valve operating element comprising an eccentric mounted upon said crank shaft, an external gear rotatably mounted upon said eccentric, the last named external gear meshing with said internal gear, a flange carried by the second named external gear, said flange being provided with a series of openings and a series of pins carried by said bearing plate and projected into the openings of said series, said pins being arranged to impart synchronous rotation to the second named external gear with respect to said cylinder block and to permit the second external gear to partake of a revolving movement within said internal gear.

MAURICE A. TIPS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."