A. J. ROWLEDGE.

VALVE GEAR.

APPLICATION FILED JAN. 8, 1912.

1,034,513. Patented Aug. 6, 1912.

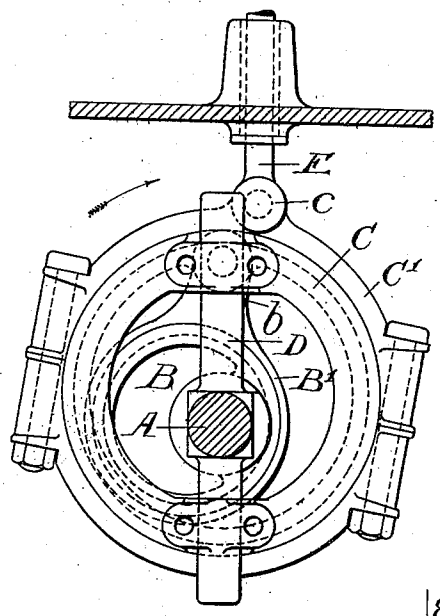

Fig. 1.

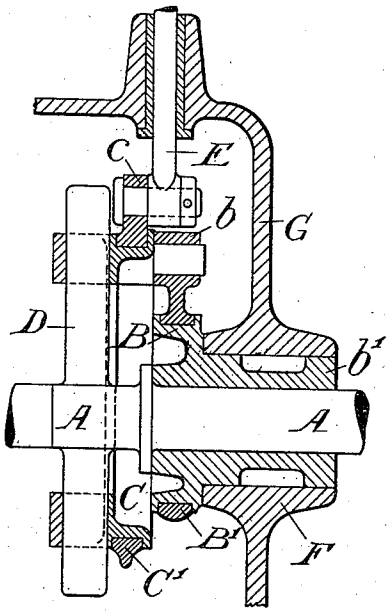

Fig. 2.

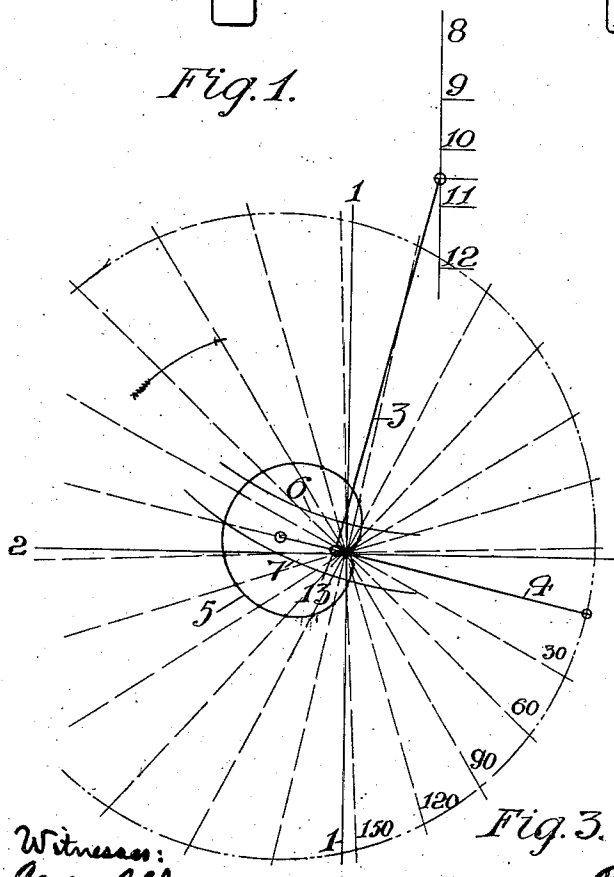

Fig. 3.

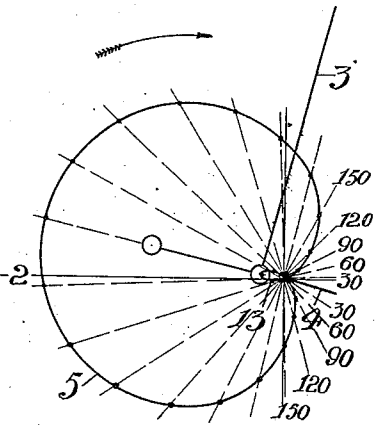

Fig. 4.

Witnesses:
Agnes L. Blume
F. G. Gillespie

Inventor:
Arthur John Rowledge
By Edmund Cowgan Brown
Attorney.

UNITED STATES PATENT OFFICE.

ARTHUR JOHN ROWLEDGE, OF BIRMINGHAM, ENGLAND, ASSIGNOR TO THE WOLSELEY TOOL AND MOTOR CAR COMPANY, LIMITED, OF BIRMINGHAM, ENGLAND.

VALVE-GEAR.

1,034,513. Specification of Letters Patent. Patented Aug. 6, 1912.

Application filed January 8, 1912. Serial No. 669,923.

To all whom it may concern:

Be it known that I, ARTHUR JOHN ROWLEDGE, a subject of the King of Great Britain, and residing at Birmingham, in the county of Warwick, England, chief draftsman, have invented certain new and useful Improvements in Valve-Gear, of which the following is a specification.

This invention relates to the type of valve gear for operating a slide valve, sleeve valve, or piston valve, used in an internal combustion engine in controlling the inlet of combustible mixture to a cylinder and the discharge of exhaust gases therefrom in a manner which insures that between the closing of the inlet and the opening of the exhaust there will be a period during which the valve is maintained substantially in its mid-position, thus completely sealing the inlet and exhaust ports during compression and explosion within the cylinder.

Describing broadly the main features of this invention:—A member is rotated directly from the half-speed shaft and is mounted in relation thereto in a manner which allows its center to move in relation to the center of the shaft, the movement of this member being transmitted to a rod which operates the valve, and another member turns about a fixed center which is eccentric to the shaft and is rotated by the first-mentioned member and controls the movement of the axis of such first-mentioned member in relation to the axis of the shaft.

Describing more specifically mechanism by which the invention is carried out, it comprises an eccentric which is rotated by the half-speed shaft and is movable in relation thereto in a manner which allows its axis to move in relation to the axis of the shaft, and a fixed eccentric, the movements of the rotating eccentric being governed by the fixed eccentric in a manner which insures a continual variation in the eccentricity of the rotating eccentric, the movements being imparted to the valve through the rotating eccentric.

According to a convenient form of this mechanism, a fixed sheave is eccentric to the axis of the half-speed shaft and a strap passes around this sheave. A turning sheave rotated by the half-speed shaft is slidingly mounted in relation thereto in a manner which allows its axis to move in relation to the axis of the shaft, and this sheave is pivotally connected with the strap of the fixed sheave and turns such strap as it is itself turned by the shaft, thereby insuring that the axis of the turning sheave will be constantly varying its position in relation to the axis of the shaft. A strap which has a turning fit around the turning sheave has a lug by which it is pivotally connected with the valve rod, and this rod is suitably guided.

In order that the invention may be clearly understood, and readily carried out, I will now describe a convenient practical form thereof which is illustrated, by way of example, by the drawings herewith, of which:—

Figure 1 is a front elevation of the valve gear. Fig. 2 is a vertical section, taken substantially in vertical planes within which, respectively, lie the axis of the half-speed shaft and the axis of the valve rod. Fig. 3 is a diagram, illustrating the path of the center of the moving sheave; and, Fig. 4 is an enlargement of a portion of the diagram shown by Fig. 3.

Referring first to Figs. 1 and 2; A is the half-speed shaft, B is a sheave which is eccentric to the shaft A and is itself fixed, and consequently remains stationary while the shaft revolves. B′ is a strap which has a turning fit around the sheave B. C is an annular sheave which is rotated by the shaft A. It is slidingly mounted on a bar D which is rigid with the shaft A and at right-angles thereto, whereby the sheave C is rotated by the shaft through the medium of the bar, and is capable of sliding endwise of the bar. The axis of the bar passes at right-angles through the axis of the sheave C. A strap C′ has a turning fit around the sheave C. The strap B′ has an arm *b* with the outer end of which the sheave C is pivotally connected, so that the sheave C turns the strap B′ as it is itself turned. The strap C′

has a lug c by which it is pivotally connected with the valve rod E, this rod being suitably guided as shown.

Assuming that the shaft A is revolving in the direction of the arrow, Fig. 1, it will turn the bar D, and consequently the sheave C, in the same direction, and the sheave C will turn the strap B′ in the same direction. The turning of the strap B′ around the fixed sheave B will cause the sheave C to be constantly moving along the bar D, and therefore constantly varying the position of its own axis in relation to that of the shaft A, with the result that movements will be imparted to the valve rod E, by the strap C′, which are compounded of the movement of rotation of the sheave C around the axis of the shaft A and of the movement of rotation of the strap B′ which is imparted thereto by the rotation of the sheave C.

The fixed sheave B is shown by Fig. 2 to be held within a double-sided boss F of the engine casing G, being formed with a portion b' of reduced diameter which fits within such boss, and the sheave acts as one of the bearings of the shaft A.

Referring to the diagram shown by Fig. 3, and to the portion thereof shown to an enlarged scale by Fig. 4, the intersection of the vertical and horizontal lines 1 and 2 indicates the center of the shaft A, the full strong line 3 indicates the distance between the center of the revolving sheave and the point of the connection of the strap C′ with the valve rod, the strong full line 4 indicates the distance between the center of the fixed sheave B and the point of connection between the revolving sheave C and the strap B′ of the fixed sheave, and the curved line 5 indicates the path of the center of the revolving sheave B. Lines 3 and 4 are marked in the positions due to the piston being at the commencement of the explosion stroke, and the broken lines marked 30, 60, 90, etc., which radiate from the center of the shaft A, indicate the angles through which the shaft A turns for thirty, sixty, ninety, etc., degrees, respectively, of the turning of the crank-axle, the crank-axle turning three hundred and sixty degrees while the shaft A turns only 180 degrees. The round dots, marked upon the curve 5 at the points where such curve crosses the broken lines which radiate from the center of the shaft A, indicate the positions into which the lower end of the line 3 will be brought when the crank-shaft has turned through the angles, respectively, which are marked against the respective radiating lines. The curved lines 6 and 7 indicate curves struck with the radius of the line 3 when the valve is just closing the induction and is just opening the exhaust, respectively, so that, when the lower end of the line 3 is anywhere in position between these lines, the valve ports are closed. Line 8 indicates the line of movement of the valve. Line 9 indicates the position of the upper end of the line 3 when the induction port is fully open, line 10 indicates its position when the induction port opens or closes, line 11 indicates its position when the exhaust port opens or closes, and line 12 indicates its position when the exhaust port is fully open.

It will be seen that, as the valve moves from its position closing the induction port to its position opening the exhaust port, the center of the revolving sheave passes through a portion of its path at a greatly reduced speed, such portion of the path forming in the particular example given a loop 13.

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

1. In valve mechanism for operating a valve of the sliding type used with an internal combustion engine, the combination of a member which is rotated directly from the half speed shaft and is mounted in relation thereto in a manner which allows its center to move in relation to the center of the shaft, a suitable connection between this member and the valve, and a member which is rotatably mounted about a fixed center which is eccentric to the shaft, said latter member controlling the movements of the axis of the first-mentioned member in relation to the axis of the shaft.

2. In valve mechanism for operating a valve of the sliding type used with an internal combustion engine, the combination of a member which is rotated directly from the half speed shaft and is mounted in relation thereto in a manner which allows its center to move in relation to the center of the shaft, a suitable connection between this member and the valve, and a member which is rotatably mounted about a fixed center which is eccentric to the shaft, said latter member being rotated by the first-mentioned member and controlling the movements of the axis of such first-mentioned member in relation to the axis of the shaft.

3. In valve mechanism for operating a valve of the sliding type used with an internal combustion engine, an eccentric which is rotated by the half speed shaft and is movable in relation thereto in a manner which allows its axis to move in relation to the axis of such shaft, a fixed eccentric which governs the movements of the rotating eccentric in a manner which insures a continual variation in the eccentricity of the rotating eccentric, and a suitable connection between the rotating eccentric and the valve.

4. In valve mechanism for operating a valve of the sliding type used with an internal combustion engine, a rotating eccentric slidable upon a transverse guide which is rigid with the half speed shaft, a strap

surrounding such eccentric, a suitable connection between such strap and the valve, a fixed eccentric, and a strap which surrounds such fixed eccentric and is pivotally connected with the rotating eccentric, substantially as described for the purpose set forth.

In witness whereof I have hereunto signed my name this 21st day of December 1911, in the presence of two subscribing witnesses.

ARTHUR JOHN ROWLEDGE.

Witnesses:
ALEXIS JACOB,
ROBERT G. GROVES.