W. H. PITTS.

AUTOMATIC COMMUTATOR.

APPLICATION FILED JULY 9, 1917.

1,281,204.

Patented Oct. 8, 1918.

3 SHEETS—SHEET 1.

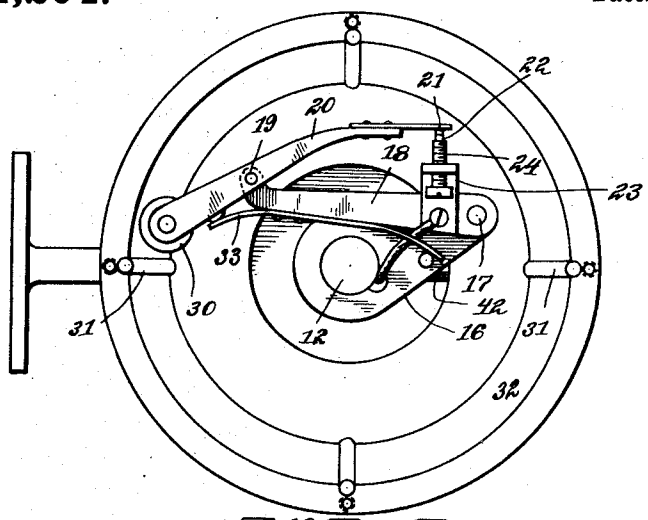


Fig. 1

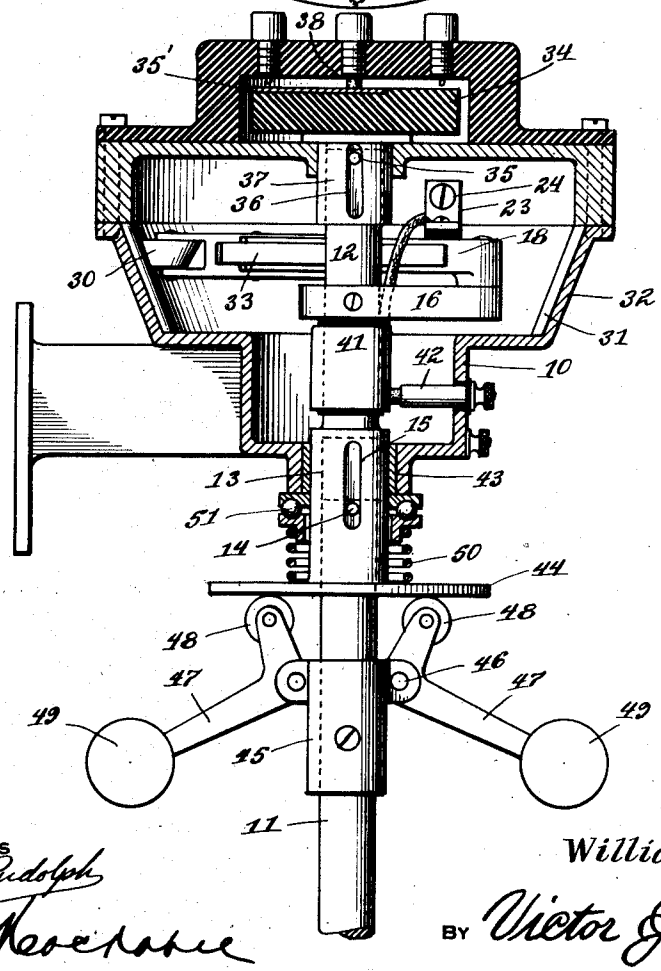


Fig. 2

WITNESSES

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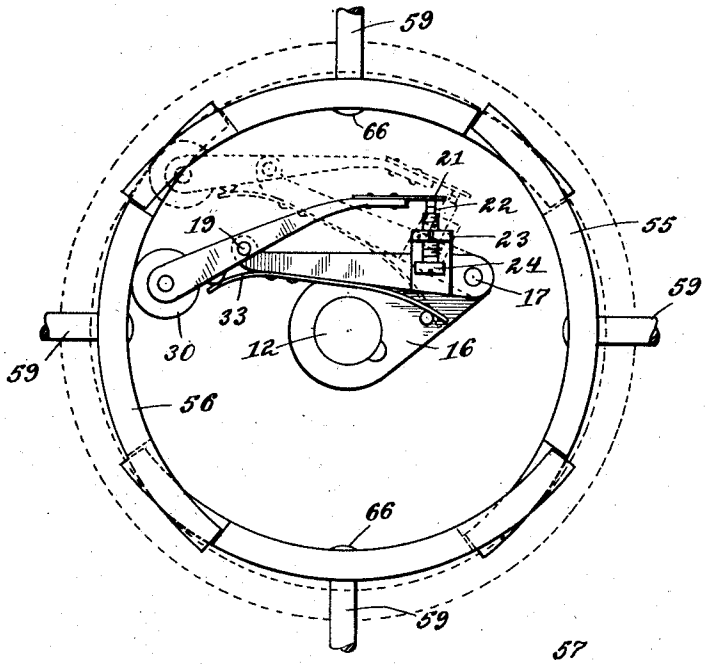


Fig. 6

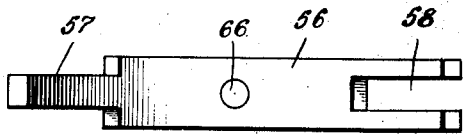


Fig. 7

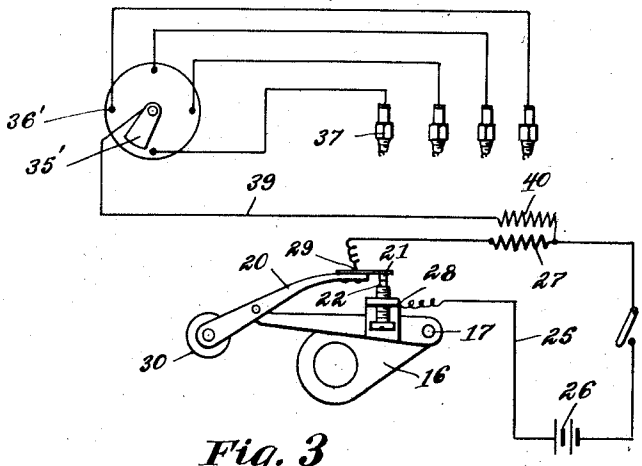


Fig. 3

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3 SHEETS—SHEET 3.

Fig. 4

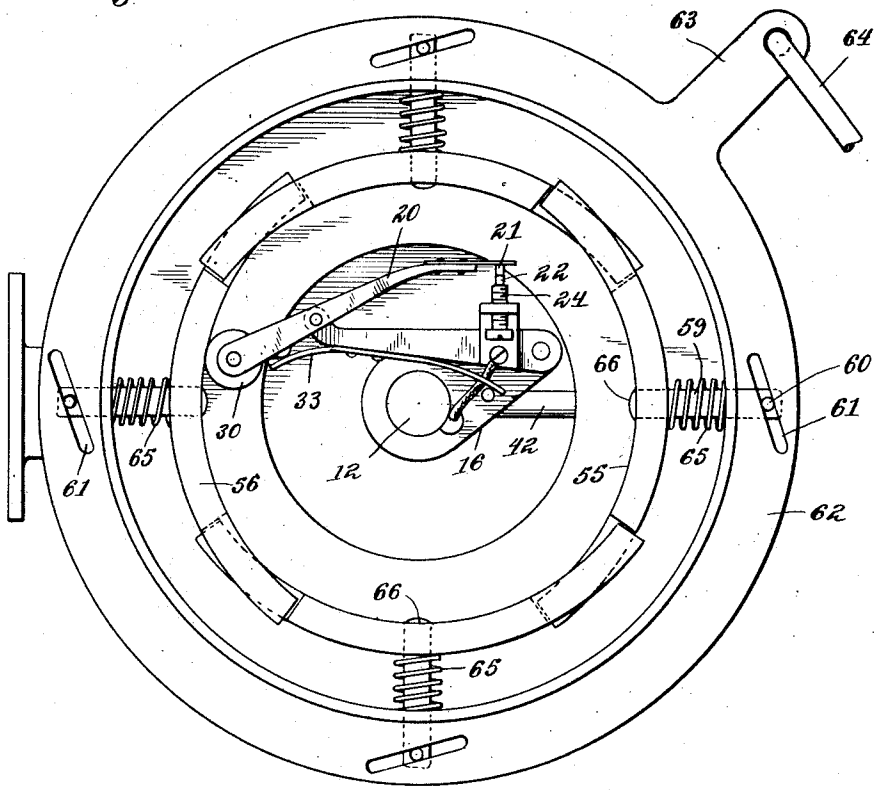
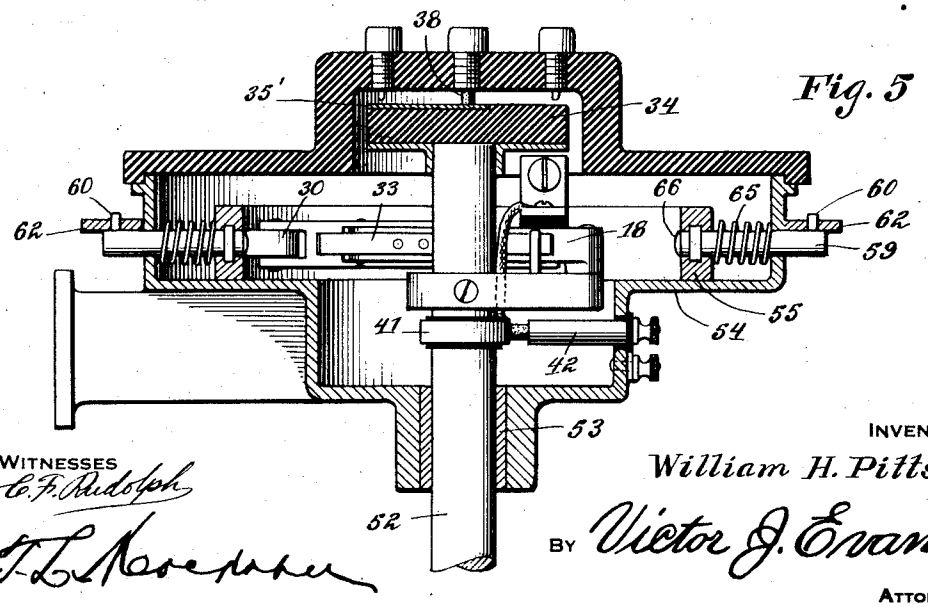


Fig. 5



WITNESSES

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UNITED STATES PATENT OFFICE.

WILLIAM H. PITTS, OF WALLA WALLA, WASHINGTON.

AUTOMATIC COMMUTATOR.

1,281,204. Specification of Letters Patent. Patented Oct. 8, 1918.

Application filed July 9, 1917. Serial No. 179,506.

To all whom it may concern:

Be it known that I, WILLIAM H. PITTS, a citizen of the United States, residing at Walla Walla, in the county of Walla Walla and State of Washington, have invented new and useful Improvements in Automatic Commutators, of which the following is a specification.

This invention relates to commutators for use in connection with internal combustion engines and aims to provide means whereby the ignition spark may be advanced or retarded to control the speed of the engine.

An object of the invention is to provide means whereby the interrupter arm may be either automatically or manually moved with respect to its operating shaft and consequently with respect to the position of the engine piston, so as to cause a change in the time of the explosion of the charge within the cylinder.

A further object of the invention is to provide a novel form of interrupter arm including novel means of mounting the same, the said arm being normally adapted to travel within a given radius, which may be increased or decreased to cause a change of position of the said arm with respect to the shaft, for the purposes above set forth.

With the above and other objects in view, the invention consists of the following novel combination and arrangement of parts, hereinafter more fully described and illustrated in the accompanying drawings, in which—

Figure 1 is a top plan view of a commutator constructed in accordance with the present invention, the cover and distributer disk being removed;

Fig. 2 is a central sectional view through the commutator complete;

Fig. 3 is a diagrammatic view illustrating the wiring of the commutator and its connection with the spark plugs of an engine;

Fig. 4 is a plan view of a modified form of the invention, with the cover and distributer disk removed;

Fig. 5 is a central sectional view of the commutator showing Fig. 4 complete;

Fig. 6 is a detail plan view showing the normal position of the parts in full lines and showing by dotted lines the position of the parts when the spark is advanced; and

Fig. 7 is a detail perspective view of one of the sections of the expansible ring shown in Fig. 6.

Referring to the drawings in detail, 10 includes a casing, in which is mounted a shaft 11 driven from any suitable source of power, for example, through a suitable gearing connected to the cam shaft of the engine, so that the said shaft 11 will be timed to rotate with the operation of the engine piston.

The shaft 11 is formed in two sections, the upper section 12 of which is connected with the lower section through the medium of a sleeved end 13, the adjacent end of the lower section fitting within this sleeve and carrying a pin 14, which operates within a slot 15 provided in the sleeve, in order that the upper section may be moved longitudinally with respect to the lower section 12.

The upper section 12 of the shaft has secured thereto an arm 16, which is adapted for rotation with said shaft, the said arm having pivoted upon its outer end as indicated at 17 one end of a lever 18. The opposite end of this lever has pivoted thereto as shown at 19 an interrupter arm 20, the said arm being pivoted intermediate its ends, and one end of which is provided with a contact point 21, which is adapted for engagement with the contact point 22, which is adjustably mounted upon the lever 18 by means of a bracket 23 and an adjusting screw 24. The contact points 21 and 22 are included in the primary electric circuit 25, which receives current from a suitable source 26. Also included in this circuit is a primary coil 27, one terminal of the circuit being connected to one switch point as shown at 28, while the other terminal is connected to the opposite switch point as shown at 29.

The arm 20 preferably carries at its outer end a roller 30, which when the shaft 11 is rotated, is adapted to contact with a series of spaced interrupter points 31, supported by an inclined wall 32 of the casing 10, the roller 30 being held in engagement with the wall 32 through the medium of the spring 33.

The upper end of the section 12 of the shaft 11 is connected to a distributer disk 34 through the medium of a pin 35, which is keyed to the slot 36 provided in the sleeve 37 secured to the under side of the disk 34. This disk is rotatable with the shaft 11 and carries a contact plate 35′, which is adapted to successively engage the series of contact points 36′, which are electrically connected to the spark plugs 37 of the engine cylinders.

The contact plate 35′ is engaged with the brush 38, which is connected to the secondary circuit through the medium of a conductor 39 in the secondary coil 40.

Mounted upon the section 12 of the shaft 11 is a collector ring 41, which the brush 42 engages in the usual manner.

From the foregoing it is apparent that the rotation of the shaft 11 will cause the roller mounted upon the end of the arm 20 to successively engage the interrupter points 31 to break the circuit 25 through the contacts 21 and 22 to make the spark.

In order to advance the spark it is necessary to change the position of the end of the arm 20 which contacts with the interrupter points, with respect to the shaft 11 and to accomplish this, the said shaft is mounted for vertical movement within a bearing 43 in the casing 10, the sleeve 13 upon which connection is made between the two sections of the shaft being provided with an annular flange 44. Mounted upon the shaft 11 beneath the flange is a sleeve 45, provided with ears 46, between which are provided bell crank levers 47, one end of each of said levers being provided with a roller 48, which engages the under face of the flange 44, while the opposite ends of each of the bell cranks is provided with a weight 49, the whole providing a centrifugal governor which is operated by the rotation of the shaft to move the section 12 thereof vertically as will be understood by reference to Fig. 2 of the drawings. Interposed between the disk 44 and the casing 10 is a coil spring 50, one end of which bears against the upper face of the flange and the opposite end bearing against a thrust bearing 51, so as to provide for a free rotation of the flange and at the same time exert a downward pressure upon the centrifugal governor.

With the increased speed of the shaft 11, the governor will cause the upper section 12 of the shaft to rise, carrying with it the interrupter arm 20 and as the spring 42 acts to force outwardly the end of the arm carrying the roller 30, the angular position of this roller will be changed with respect to the shaft 11, moving the roller around said shaft in an arc tangent thereto, so that the spark will occur in advance of its normal time. The reduction of the speed of the shaft 11 will cause the lowering of the section 12 and a movement of the roller 30 around the said shaft in the opposite direction, causing the consequent retarding of the spark.

In the form of the invention shown in Figs. 4 to 7 inclusive, the shaft 52 is not movable longitudinally, it being mounted for rotation upon the bearing 53 provided with a casing 54.

This casing has located therein an expansible ring 55 composed of a plurality of arcuate sections 56, each of which is formed at one end with a tongue 57, and its opposite end with a slot 58, the tongue 57 of one section entering the slot 58 of the adjacent section and capable of sliding movement therein.

Each of the sections 56 is provided with a radially arranged rod 59, one end of which is secured to the section 56, the opposite end of the said rod being provided with a pin 60, which is adapted to engage the cam slot 61 provided in the ring 62, which surrounds the casing 54 and is capable of rotation thereon. The ring 62 is provided with an arm 63, which is connected to any suitable automatic or manually operating means through the medium of a rod 64. A movement of the ring 62 around the casing 54, will through the medium of the slots 61 cause the section 56 of the ring 55 to move inward or outward, to increase or decrease the diameter of the ring, to change the position of the roller 30 with respect to the shaft 52 as set forth in the description of the previous form of the invention, the roller 30 being carried by the arm 20, which is secured to the shaft 51 as in the previously explained form.

The sections 56 of the ring 55 are normally pressed inward to decrease the diameter of the ring, through the action of springs 65, which are mounted on the rods 50, the inner ends of these rods extending through to the inside of the ring and forming interrupter points 66, for contact with the roller 30 so as to break the circuit and cause the spark. In other respects, the construction and operation of the invention is similar to the form previously described and it is not thought necessary to repeat the same.

Various changes in the form, proportion and minor details of construction may be made and the right is reserved to make such changes as will fall within the scope of the claims hereto appended.

Having described the invention, what is claimed is:

1. A commutator embodying a longitudinally movable rotatable shaft, an electric circuit, an element associated with said shaft for rotation therewith and controlling said circuit, said arm being capable of lateral movement with respect to the shaft,—interrupter points located in the path of movement of said element for creating a spark and means including a wall of varying diameter for permitting a longitudinal and lateral movement of said element for advancing or retarding the spark.

2. A commutator embodying a longitudinally movable rotatable shaft, an electric circuit, an element associated with the shaft for rotation therewith, said element controlling said circuit, interrupter points located in the path of movement of said element for creating a spark and means including an in-

clined wall for permitting the shifting of said element through the longitudinal movement of the shaft for advancing or retarding the spark.

3. A commutator embodying a longitudinally movable rotatable shaft, an arm secured thereto, a spring controlled lever having one end pivotally secured to said arm, a spring pressed element pivotally secured to the opposite end of said lever, an electric circuit, interrupter points located in the path of movement of said element for interrupting the circuit for creating a spark and means whereby the arm may be moved laterally with respect to the shaft upon longitudinal movement of the latter for advancing or retarding the spark.

4. A commutator embodying a vertically movable rotatable shaft, an arm secured thereto, a lever having one end pivotally secured to said arm, a pivoted element carried by said lever, a single spring secured to the lever for urging the latter and the pivoted element away from said shaft, an electric circuit, interrupter points located in the path of movement of said element for interrupting the circuit to create a spark and means whereby the arms may be moved laterally with respect to the shaft upon longitudinal movement of the latter for advancing or retarding the spark.

5. In a commutator, a rotatable shaft, an electric circuit, spaced interrupter points, an arm rigidly secured to said shaft and rotatable thereof, an arm having one end pivotally secured to the first mentioned arm, a lever pivotally secured to the opposite end of the second mentioned arm and adapted to engage the spaced interrupter points, a circuit breaker included in said circuit and interposed between the first and second mentioned arms and spring actuated means for normally closing the circuit breaker and holding the second mentioned arm in position for engagement with the interrupter points.

6. In a commutator, a rotatable shaft, an electric circuit, spaced interrupter points, an arm rigidly secured to said shaft and rotatable therewith, an arm having one end pivotally secured to the first mentioned arm, a lever pivotally secured to the opposite end of the second mentioned arm and adapted to engage the spaced interrupter points, a circuit breaker included in said circuit and interposed between the first and second mentioned arms and a common spring actuated means for normally closing the circuit breaker and holding the second mentioned arm in position for engagement with the interrupter points.

In testimony whereof I affix my signature.

WILLIAM H. PITTS.