Mar. 6, 1923. 1,447,745

C. L. ATKINSON

DISTRIBUTOR FOR GAS ENGINES

Filed June 10, 1920 2 sheets-sheet 1

Fig. 1.

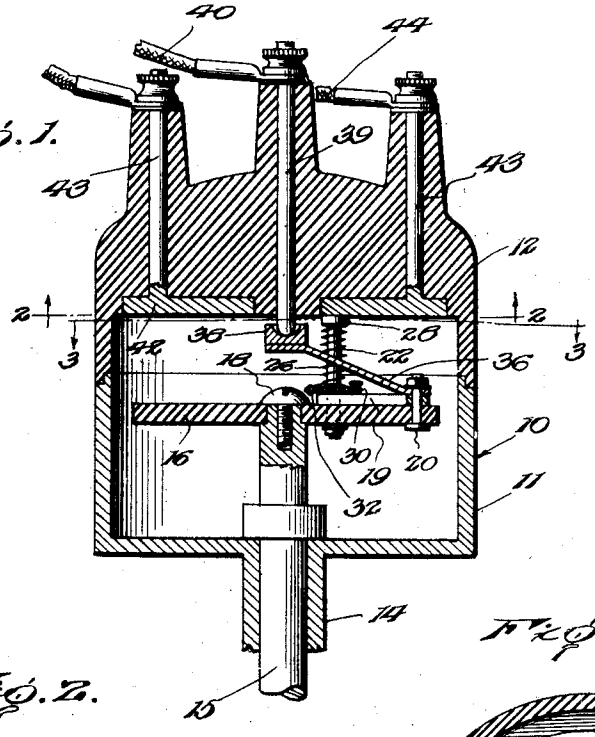


Fig. 2.

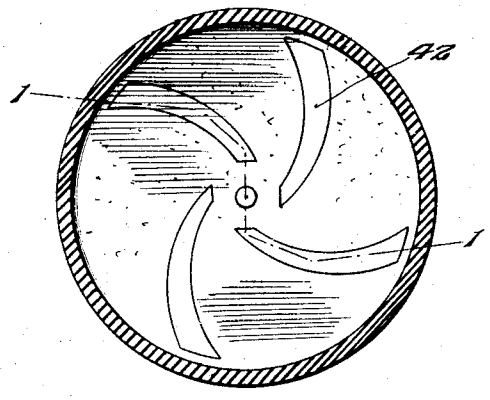
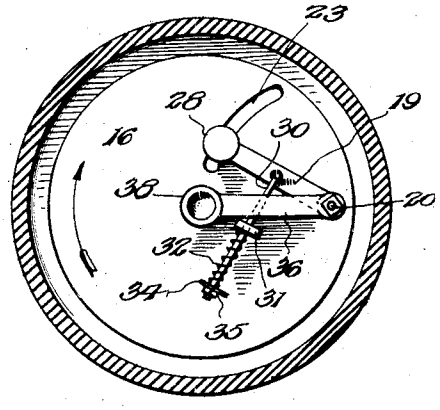


Fig. 3.



Inventor

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By Lacey & Lacey, Attorneys

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2 sheets-sheet 2

Fig. 4.

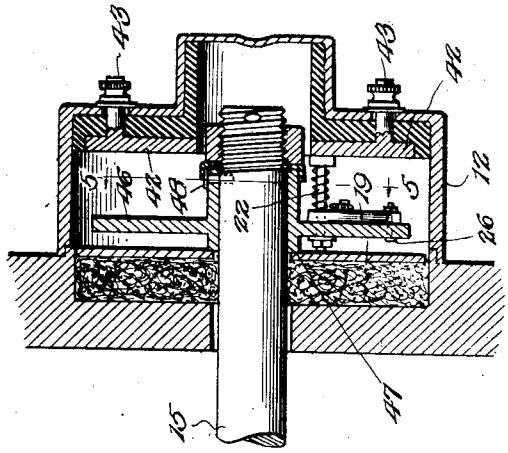


Fig. 5.

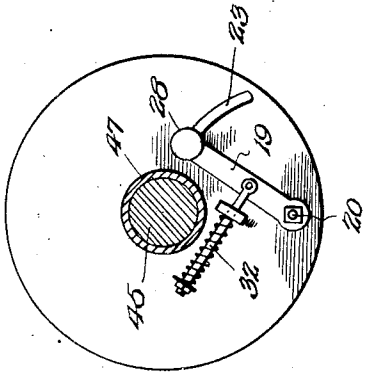
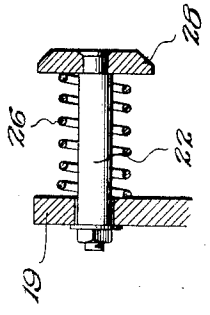


Fig. 6.



Inventor

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Patented Mar. 6, 1923. 1,447,745

UNITED STATES PATENT OFFICE.

CHARLES L. ATKINSON, OF CYNTHIANA, KENTUCKY.

DISTRIBUTOR FOR GAS ENGINES.

Application filed June 10, 1920. Serial No. 387,909.

To all whom it may concern:

Be it known that I, CHARLES L. ATKINSON, a citizen of the United States, residing at Cynthiana, in the county of Harrison and State of Kentucky, have invented certain new and useful Improvements in Distributors for Gas Engines, of which the following is a specification.

This invention relates to improvements in commutators especially adapted for use on internal combustion engines.

An important object of this invention is to provide a commutator for internal combustion engines having novel means for advancing the spark as the speed of the engine increases, and for retarding the spark when the speed of the engine decreases.

The invention further aims to provide a distributor for internal combustion engines having means for utilizing centrifugal force to automatically control the spark of the spark plugs attached to the several cylinders of the engine.

A further object of this invention is to provide a commutator for internal combustion engines which is entirely automatic in its operation and which does not require frequent attention or adjustment.

A further object of the invention is to provide a commutator of the class described which is of highly simplified construction, efficient in use and cheap to manufacture.

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

In the accompanying drawings forming a part of this application and in which like numerals are employed to designate like parts throughout the same;

Figure 1 is a central vertical section through a commutator embodying the invention,

Figure 2 is a horizontal section taken on line 2—2 of Figure 1, the view being taken in the direction of the arrows,

Figure 3 is a horizontal section taken on line 3—3 of Figure 1, the view being taken in the direction of the arrows,

Figure 4 is a central vertical section through a slightly modified form of commutator,

Figure 5 is a sectional view taken on line 5—5 of Figure 4, the view being taken in the direction of the arrows,

Figure 6 is a detail section through the commutator illustrated in Figure 4.

In the drawing wherein for the purpose of illustration is shown a preferred embodiment of the invention, the numeral 10 generally designates the improved commutator which includes a cylindrical casing 11 having a head 12 of insulating material. By reference to Figure 1, it will be observed that the head 12 is detachable from the casing 11 so that access may from time to time be had to the interior of the casing.

The casing 11 is formed on its under side with a centrally arranged sleeve 14 through which an operating shaft 15 is rotatably extended and which is generally an extension of the cam shaft of the engine to which the commutator is applied. It is obvious, however, that the shaft 15 which operates the commutator need not be a cam shaft nor an extension of the same but may be a shaft having indirect or direct connection with the crank shaft of the engine. The end portion of the shaft 15 is extended through a centrally arranged opening in a support 16 which, as illustrated in Figure 1, is in the form of a disk of insulating material. The disk is securely though detachably secured to the shaft 15 through the medium of a cap screw 18 having an enlarged head which bears against the face of the disk support 16.

As set forth in Figures 1 and 3, a link or arm 19 is pivoted at one end to the peripheral portion of the disk 16 through the medium of a pivot bolt 20. The pivot bolt 20 allows the free end portion of the arm 19 to swing outwardly or in the direction of the periphery of the disk 16 as the speed of the shaft increases. On the other hand the pivot bolt 20 allows the free portion of the arm 19 to swing inwardly when centrifugal force decreases as the result of a decrease in the speed of the shaft 15. The free end portion of the arm 19 has connection with a contact pin 22 which is movable through an arcuate slot 23 formed in the disk 16 and which is in the arc of a circle which intersects the axis of the disk 16. In addition to being movable across the disk 16, the contact pin 22 is movable longitudinally and is pressed by a coil spring 26 confined between the enlarged head 28 of the contact pin and the upper face of the pivoted arm 19. As is obvious the pin 22 is slidably but snugly extended through said arm so that the arm will be sufficient to support the contact pin at right angles thereto during the rotation of the disk 16

As illustrated in Figure 3, a rod 30 is pivoted to the intermediate portion of the arm 19 and is extended through an upstanding lug or ear 31 which forms an abutment for one end of a retractile coil spring 32 carried by the rod 30. A washer 34 arranged on the rod 30 limits the movement of the spring 32 and is held upon the rod by a small adjusting nut 35. By this construction the pivoted arm 19 is normally retained in the position illustrated in Figure 3 or in an inner position. As the speed of the disk 16 is increased, the arm is by centrifugal force moved outwardly directly in proportion to the speed of the disk. As the speed of the disk decreases the pivoted arm 19 is gradually drawn inwardly by the retractile coil spring 32. By adjusting the nut 35, the tension of the spring 32 may be varied.

A spring contact arm 36 also has pivotal connection with the pivot bolt 20 and has one end portion slightly offset and provided with a contact brush 38 which is arranged in line with the axis of the shaft 15. The brush 38 is, however, spaced from the adjacent end of the shaft and is provided with a socket or recess which receives a center post 39 having connection with a source of electrical energy through a feed wire 40.

As illustrated in Figure 1, the lower end portion of the center post 39 is rounded and extends beyond the adjacent face of the head 12, so that the same may be rotatably received within the socket in the upper side of the brush 38. During the rotation of the disk 16, the outer portion of the spring contact arm 36 moves about the axis of the shaft 15 and the inner end portion of the arm, which carries the brush 38 remains in line with the axis of the shaft so that the brush 38 is at all times in electrical contact with the center post 39.

As illustrated in Figures 1 and 2, a plurality of spaced stationary metallic contacts 42 are embedded in the head 12 and are engaged by the head 28 during the rotation of the contact pin 22 about the axis of the shaft 15. Under ordinary running conditions or when the motor is running at a normal speed, centrifugal force will of course position the contact pin 22 in the intermediate portion of the slot 23 so that the head 28 of said pin will engage the intermediate portions of the stationary contacts 42. The stationary contacts 42 are curved longitudinally in the direction opposite the direction of rotation of the disk 16 whereby the head 28 will engage the stationary contacts earlier when the speed of the motor is increased than when the speed of the motor is decreased. In other words, the time of contact of the members 28 and 42 is advanced as the pivoted arm 19 is moved outwardly. In this manner the spark supplied to the several spark plugs of the motor is automatically adjusted to conform to the speed of the motor. The stationary contacts 42 of course have connection with conducting posts 43 which in turn have connection with branch wires 44 which have electrical connection with the several spark plugs in the usual manner.

It will be noted with particular reference to Figure 2, that the stationary contacts 42 gradually widen towards their outer ends so that in addition to advancing the spark as the speed of the motor increases, the spark is prolonged for thoroughly igniting all of the gases within the combustion chambers.

In the form of the invention illustrated in Figures 4, 5 and 6 the shaft 15 is provided with a metallic disk 46 having a centrally arranged sleeve 47, which is rigidly secured to the shaft through the medium of a pin 48. The commutator illustrated in these views is especially adapted for use in connection with Ford motors since the current is grounded through the commutator. Therefore, the current is not conveyed through the contact spring 36, as illustrated in Figure 1 but the circuit is completed by the engagement of the contact pin 22 with the several longitudinally curved stationary contacts 42. As illustrated in Figure 6, the contact head 28 of the contact pin 22 is rotatable so as to reduce friction between the parts to a minimum.

In the use of the improved commutator, the pivoted arm 19 moves outwardly in proportion to the speed of the motor so that the spark in the combustion chambers of the engines will be advanced with relation to the positions of the several pistons. The outward movement of the pivoted arm 19 also prolongs the spark in the several cylinders so as to assure complete combustion of the gases.

With reference to the foregoing description it will be apparent that a commutator constructed in accordance with this invention operates entirely automatically and without attention on the part of the operator. Also the commutator is possessed of a minimum number of wearing parts so that the same is rendered highly durable.

It is to be understood that the form of the invention herewith shown and described is to be taken as a preferred embodiment of the same and that such minor changes in construction and arrangement of parts may be made as will remain within the spirit of the invention and the scope of what is claimed.

Having thus described the invention, what is claimed as new is:

1. A commutator comprising a casing, a support rotatable within the casing, an arm pivoted to the support to swing in a radial direction thereon, and a contact element carried by said arm and movable between the axis and the outer edge of said support.

2. A commutator comprising a casing, a support rotatably arranged within the casing, a contact element mounted upon the support and movable in a radial direction toward the outer edge of the same, spring means for normally holding said contact element inwardly, and a plurality of spaced contacts adapted to be engaged by said movable contact element.

3. A commutator comprising a casing, a rotary support arranged within the casing, an arm pivoted at one end portion to said support, a contact element upstanding from the arm parallel to the axis of rotation of the support, and a plurality of stationary contacts carried by the casing at substantially right angles to the axis of rotation of said support and engageable by said element.

4. A commutator comprising a casing, a rotary support within the casing having an arcuate slot, an arm pivoted at one end portion to said support, a contact element extending through said slot and the free end portion of said arm, means urging said arm inwardly, and a plurality of stationary contacts carried by said casing.

5. A commutator comprising a casing, a rotary support carried within said casing, an arm pivoted at one end portion to said support, a contact element extending through said support and said arm and movable at substantially right angles thereto, means advancing the element, and a plurality of spaced stationary contacts engageable by said element.

6. A commutator comprising a rotary support, an arm pivoted at one end portion to said support, an upstanding contact element slidable endwise upon said arm and provided with a head, a spring confined between said arm and the head for advancing said element longitudinally, and a plurality of stationary contacts engageable by the head.

7. A commutator comprising a casing, a rotary support arranged within said casing and provided with an arcuate slot, an arm pivoted at one end portion to said support, a contact pin extending through said slot and the other end portion of said arm and provided with a head, and a coil spring surrounding said pin and confined between the head of the same and said arm.

8. A commutator comprising a casing, a rotary support arranged within said casing and provided with an arcuate slot, an arm pivoted at one end portion to said support, a contact pin extending through said slot and the other end portion of said arm and provided with a head, a coil spring surrounding said pin and confined between the head of the same and said arm, and a plurality of longitudinally curved stationary contacts engageable by said head and increasing in width in the direction of the outer ends thereof.

9. A commutator comprising a casing, a rotary support arranged within said casing and provided with an arcuate slot, an arm pivoted at one end portion to said support, a movable contact pin extending through said slot and the other end portion of said arm and provided with a head, a coil spring surrounding said pin and confined between the head of the same and said arm, a plurality of longitudinally curved stationary contacts engageable by said head and increasing in width in the direction of their outer ends, and spring means urging said arm and said contact pin inwardly toward the center of said support.

10. A commutator including a casing provided with a head, a plurality of longitudinally curved stationary contacts carried by said head and arranged tangentially to the axis of the same, a rotary support arranged within said casing, an arm pivoted to said element, a contact pin extending through said element and movable transversely of the same, said arm being provided with an opening slidably receiving said pin, means urging said pin in the direction of the center of said support, a center post carried by said head, and a contact element connected to said arm and coacting with the center post.

11. A commutator comprising a casing provided with a head, a plurality of stationary contacts carried by the head and disposed tangentially with relation to the axis of the same, a rotary support arranged within said casing, a longitudinally movable contact pin carried by said element and movable transversely of the same, means urging said pin longitudinally to coact with said stationary contacts, an arm pivoted to said support and having connection with said pin, a rod connected to said arm, means engaging said rod for moving said arm and said contact pin inwardly, a conductor carried by said head, and means electrically connecting said conductor with said longitudinally movable pin.

12. A commutator comprising a rotary support, a contact pin movably carried by said support and provided with a head, spring means for urging said contact pin inwardly toward the center of said support, a conductor, means electrically connecting said conductor with said contact pin, and a plurality of stationary contacts engageable by said head.

13. A commutator comprising a casing, a plurality of stationary contacts carried by said head and arranged tangentially with relation to the axis of the same, a contact element arranged within said casing, means restraining said element against the action of centrifugal force to normally coact with

the inner portions of said contacts, a conductor, and means electrically connecting said conductor and said element.

14. A commutator comprising a casing provided with a plurality of stationary contacts, a disk arranged within the casing, an arm pivoted to said disk, a contact element carried by said arm and adapted to engage said stationary contacts, a center post carried by said casing, and a spring contact electrically connecting said center post and said arm.

15. A commutator including fixed contacts, a rotary support, a pivoted arm mounted to swing upon said support, and an upstanding contact carried by the arm to cooperate with the fixed contacts.

16. A commutator including fixed contacts, a rotary support, an arm mounted to swing upon the support, a contact carried by said arm to cooperate with the fixed contacts, and a contact arm carried by the support to coact with the conductor and electrically connected with the first arm.

In testimony whereof I affix my signature.

CHARLES L. ATKINSON. [L. S.]