C. C. WILLIAMS.

SPARKING DEVICE FOR INTERNAL COMBUSTION ENGINES.

APPLICATION FILED DEC. 11, 1909.

1,029,903. Patented June 18, 1912.

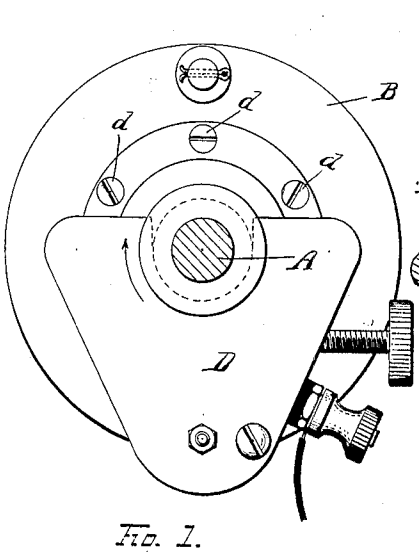

Fig. 1.

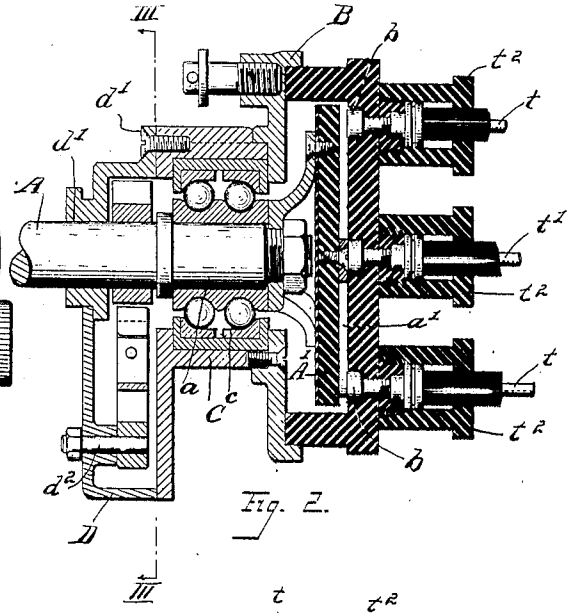

Fig. 2.

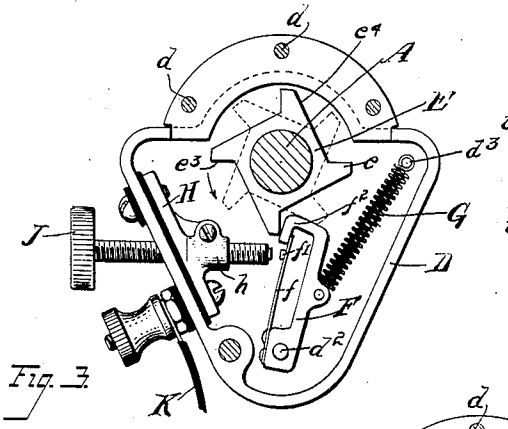

Fig. 3.

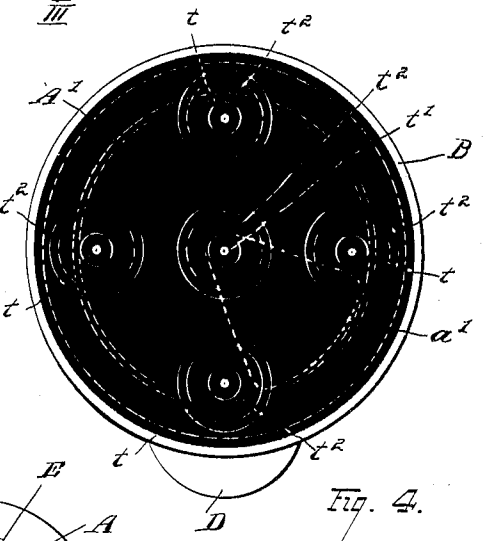

Fig. 4.

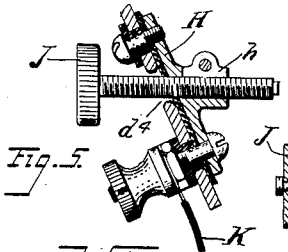

Fig. 5.

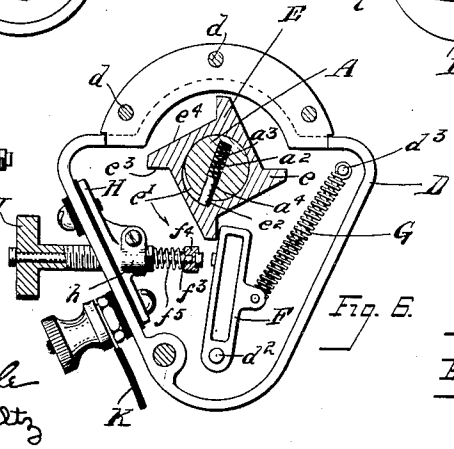

Fig. 6.

Witnesses

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UNITED STATES PATENT OFFICE.

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SPARKING DEVICE FOR INTERNAL-COMBUSTION ENGINES.

1,029,903. Specification of Letters Patent. Patented June 18, 1912.

Application filed December 11, 1909. Serial No. 532,527.

To all whom it may concern:

Be it known that I, CHARLÉ C. WILLIAMS, a citizen of the United States, resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented a new and useful Improvement in Sparking Devices for Internal-Combustion Engines, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

My invention relates to sparking devices for internal combustion engines, its object being to provide a device of this character in which the length of time in which the primary circuit is closed, may be independent of the speed of revolution of the engine, in an efficient and economical manner.

A further object is to so arrange the parts that they may be readily accessible, so that they may be conveniently removed, repaired, or new parts substituted.

The said invention consists of means which hereinafter are fully described and more particularly set forth in the claims.

The annexed drawing and the following description set forth in detail certain mechanism embodying my invention, the disclosed means, however, constituting but one of various mechanical forms in which the principle of the invention may be applied.

In said annexed drawing:—Figure 1 is an end elevation of a device embodying my invention. Fig. 2 is an axial cross section thereof. Fig. 3 is a cross section taken upon the plane indicated by line III—III in Fig. 2, and viewed in the direction indicated by the arrow in said figure. Fig. 4 is an elevation of the end of the device opposite that illustrated in Fig. 1. Fig. 5 is a detail cross-section. Fig. 6 is a section similar to that shown in Fig. 3, illustrating a modified form of my invention.

As is customary, the timer or cam shaft A projects into the housing of the sparking device embodying my invention. This housing comprises three main parts, a part B, which carries the terminals t and t', mounted in suitable insulating thimbles t^2, of the secondary circuits, and which is of the ordinary well-known construction, further amplification of the description thereof being therefore unnecessary in this application. A second member C of the housing is provided with a ball bearing c, and in this bearing is mounted the journal a of the timer or cam shaft, suitable balls being interposed between the journal and bearing, as is shown. Upon this housing member C is mounted a third and inclosing housing member D, which is removably secured to the member C by means of suitable screws d. An opening d' is provided in the member D, through which the shaft A projects. The inner end of the shaft carries a rotating disk A′, of insulating material, on which is mounted the distributer a', which is adapted to successively come in opposition with the terminals b of the secondary circuits.

Located in the interior of the housing member D and upon the shaft A is loosely mounted a member E, formed with circumferential teeth e, equal in number to the number of cylinders of the engine, in this instance illustrating a member adapted for use in connection with a four-cylinder engine. As shown in Fig. 6, the shaft is provided with a recess a^2, in which is located a coil-spring a^3 bearing upwardly against a cylindrical pawl a^4. The outer end of this pawl bears against the interior surface of the toothed member E, in which surface is formed a groove e' beginning in the cylindrical interior bearing surface of member E, and ending in a shoulder e^2. As shown, the shoulder is formed at that end of the groove farthest removed from its point of intersection with the cylindrical bearing surface above referred to, in the direction of forward rotation of the engine, such forward direction being indicated by the arrows in the figure. It will therefore be seen that when the engine, and consequently the shaft, is rotated in the forward direction, the member E and the shaft are fixed to each other, and when the engine and shaft are rotated in the opposite direction, the member E may be held in a stationary position without interfering with the continued opposite rotation of such shaft, the pawl a^4 disengaging such member E, as will be readily understood.

Each tooth is formed with a radial sur-

face e^3 and with a tangential surface e^4, which is continued across the member E until it joins the inner end of the adjacent radial surface e^3. As shown, the radial surfaces e^3 are located in advance of the tangential surfaces e^4, with reference to the forward direction of rotation of the shaft.

Mounted upon a fixed pin d^2 projecting into the interior of the member D, is an oscillatory contact member F whose free end projects normally into the path of rotation of the teeth of the member E, and is held in such normally projecting position by means of a coil-spring G, one end of which is attached to the member F, and the other end of which is attached to a pin d^3, also fixed to and projecting into the interior of the housing member D.

Secured upon the interior of the housing member D and adjacent to an opening d^4 formed therein, Fig. 5, is a member H formed with a split nut h, whose thread is engaged by a thumb screw J having its head upon the exterior and its inner end projecting toward and in the path of oscillation of the oscillatory member F. This screw forms a second contact member, and its supporting member H is suitably insulated from the casing, as shown. The said member H is connected in the usual manner to one of the terminals K of the primary circuit, the other terminal of such circuit being grounded through the engine, as will be understood.

As will be noted, the inner or contact end of the screw J may be adjusted toward or from the oscillatory member F by turning the screw. The latter is fixed in any desired position by means of a suitable screw passing through the split portion of the nut, as will be understood.

In the form of the device illustrated in Fig. 3, the member F is provided with a yielding portion f which carries the contact point f' which makes the direct contact between the member F and the inner end of the screw J. The free end of the member f is provided with a hook-portion f^2, against whose inner surface the outer or free end of the spring f normally rests. This leaves an interior space, into which during contact the spring f will be pressed, away from the inner surface of the hook portion f^2 and in the reverse direction of movement thereof.

When the above described structure is in its normal or resting position, in which the rotary member E is out of engagement with the oscillatory contact member F, the latter occupies a normal or neutral position in which the axis of member F, point of attachment of spring G with the latter, and point of attachment of the spring with the casing D, are in alinement. It will therefore be noted that the member F is capable of movement in both directions laterally of said neutral position. In this position the contact screw J is out of engagement with the oscillatory member F.

When the engine is rotated in a forward direction, the teeth e successively engage the oscillatory member F, and move same away from the inner end of the screw J, against the action of the spring G. After the engaging tooth has passed a given distance, member F is released and snaps toward the screw's end, as the result of the action of the spring, and a distance sufficient to cause the contact portion f' to engage the contact portion of the screw. Immediately after such contact, the spring again positively returns the member F to its normal position, which position it occupies until the next tooth repeats the same operation. It will be seen that the length of time during which contact is maintained between the screw end and the contact portion f' depends upon the distance between said contact portion when the member F is in its normal position, and such screw end. That is, the nearer the screw end is to such portion f' when said member F is in said normal position, the longer will be such contact, and the farther away that said two parts are, the shorter will be such contact. The strength of the spring G is made such that the member F will always recover its normal position before the next succeeding tooth comes into action, so that it will be seen that the length of time of the successive contact periods will always be independent of the velocity of revolution of the teeth e, and hence independent of the velocity of the timer or cam shaft. The total length of time, therefore, in which the primary circuit is complete is directly proportionate to the number of revolutions for any given adjustment of the screw J.

By mounting the two contact members F and J on the detachable housing member D and securing them by means of the removable screws d', it will be seen that these parts of the mechanism may be readily detached for inspection and removed for repairs. These parts, when embodied in an automobile, may also be removed and carried away for the purpose of preventing an automobile from being stolen or used by unauthorized persons.

Instead of providing the oscillatory member F with the yielding portion or spring f, the said member F may be made rigid throughout, and the yielding portion of the mechanism be made a part of the adjustable contact member J. Such a modification is shown in Fig. 6, in which the inner end of the screw is shown to be provided with a central bore into which projects a pin f^3 carrying upon its outer end a head f^4, which latter forms the direct contact portion of the member. A suitable coil spring f^5 is interposed between the head f^4 and the main

body of the screw, as will be readily understood.

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

1. In a sparking device for internal combustion engines, the combination of an oscillatory contact member arranged to have a neutral position and movable in both directions laterally from said position; a second contact member normally out of contact with said oscillatory member; and a member adapted to intermittently engage and disengage said oscillatory member, whereby said two contact members are caused to engage each other, the engagement of said engaging member with said oscillatory member being such as to effect the movement of the latter away from said second contact member; said oscillatory member being free from electrical connection during such last-described movement.

2. In a sparking device for internal combustion engines, the combination of an oscillatory contact member arranged to normally occupy a neutral position, movable in both directions laterally from said position, and provided with a yielding portion; a second and stationary contact member normally out of contact with said oscillatory member, and lying in the path of oscillation of said yielding portion of the oscillatory member; and a member adapted to intermittently engage and disengage said oscillatory member to effect its oscillation in both directions laterally of said neutral position, whereby said yielding portion is caused to intermittently engage said stationary contact member; said oscillatory member being free from electrical connection during its oscillatory movement away from said latter member; said engaging means being adapted to effect the positive movement of said oscillatory contact member away from said stationary contact member, the latter being always out of engagement with said oscillatory contact member during such movement.

3. In a sparking device for internal combustion engines, the combination of an oscillatory contact member, spring means tending to impart to said member a neutral position, and arranged to permit it to move in both directions laterally of said neutral position and against the action of said spring means; a member adapted to intermittently engage and disengage said oscillatory member; and a stationary contact member lying in the path of said oscillatory member, normally out of engagement therewith, the movement imparted to the oscillatory member by the engagement of the engaging member being in a direction away from said stationary member; said oscillatory member being free from electrical connection during its movement away from said stationary member.

4. In a sparking device for internal combustion engines, the combination of an oscillatory contact member; means tending to impart to said member a neutral position while allowing it to move in both directions laterally of said position and in opposition to said means; a member adapted to intermittently engage and disengage said oscillatory member, whereby such movement in both directions is effected; and a second contact member lying in the path of oscillation of said oscillatory contact member; one of said contact members being provided with a yielding member comprising the contact portion thereof; said oscillatory member being free from electrical connection during its movement away from such second contact member; said engaging means being adapted to effect the positive movement of said oscillatory contact member away from said stationary contact member, the latter being always out of engagement with said oscillatory contact member during such movement.

5. In a sparking device for internal combustion engines, the combination of a suitable housing member; an oscillatory contact member mounted on said member; a coil-spring having one of its ends secured to said housing member and its other end secured to said oscillatory member; a second contact member; said spring adapted to impart to said oscillatory member a normal position in which it is out of contact with said second contact member, and whereby it may be moved toward and from the latter in opposition to such spring; and a member adapted to intermittently engage said oscillatory member to move same away from said second-named contact member, whereby such oscillatory member is intermittently released and impelled toward said second-named contact member by the action of said spring.

6. In a sparking device for internal combustion engines, the combination of a suitable housing member; an oscillatory contact member mounted on said member; a coil-spring having one of its ends secured to said housing member and its other end secured to said oscillatory member; a second contact member; said spring adapted to impart to said oscillatory member a normal position in which it is out of contact with said second contact member, and whereby it may be moved toward and from the latter in opposition to such spring; and a member adapted to intermittently engage said oscillatory member to move same away from said second-named contact member, whereby such oscillatory member is intermittently released and impelled toward said second-named contact member by the action of said

spring; said oscillatory member being free of electrical connection at all times while out of contact with said second-named contact member; said engaging means being adapted to effect the positive movement of said oscillatory contact member away from said stationary contact member, the latter being always out of engagement with said oscillatory contact member during such movement.

Signed by me, this 9th day of December, 1909.

CHARLE C. WILLIAMS.

Attested by—
CURT B. MUELLER,
WINIFRED WALTZ.