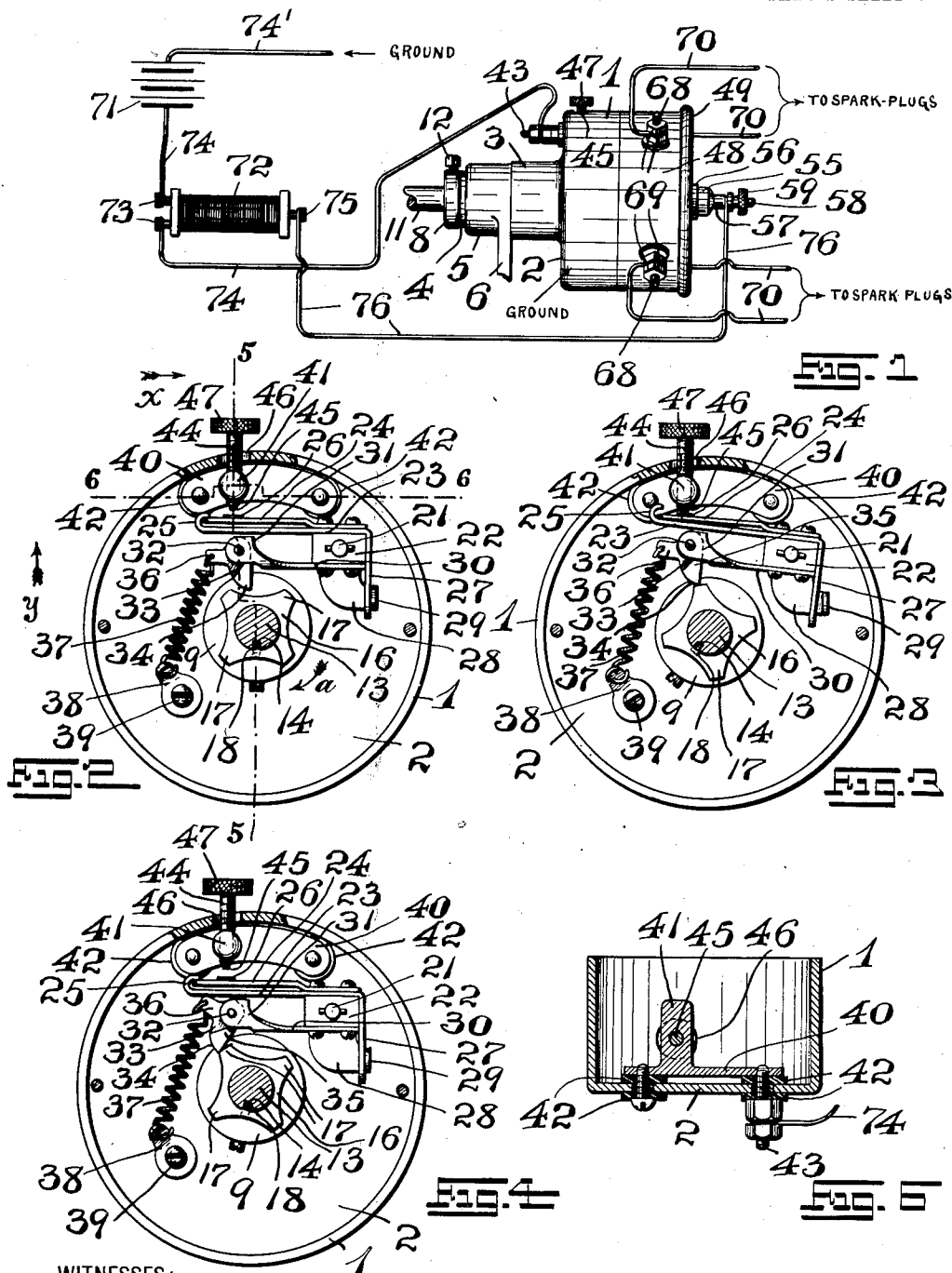


J. M. SMITH.
CURRENT DISTRIBUTER AND TIMER.
APPLICATION FILED MAY 17, 1912.

1,064,177.

Patented June 10, 1913.

2 SHEETS—SHEET 1.



WITNESSES:
Harry E. Pfeiffer
Frank W. Trautzel

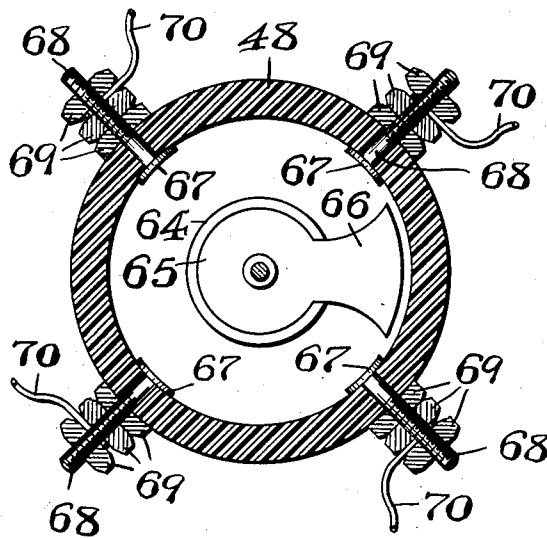
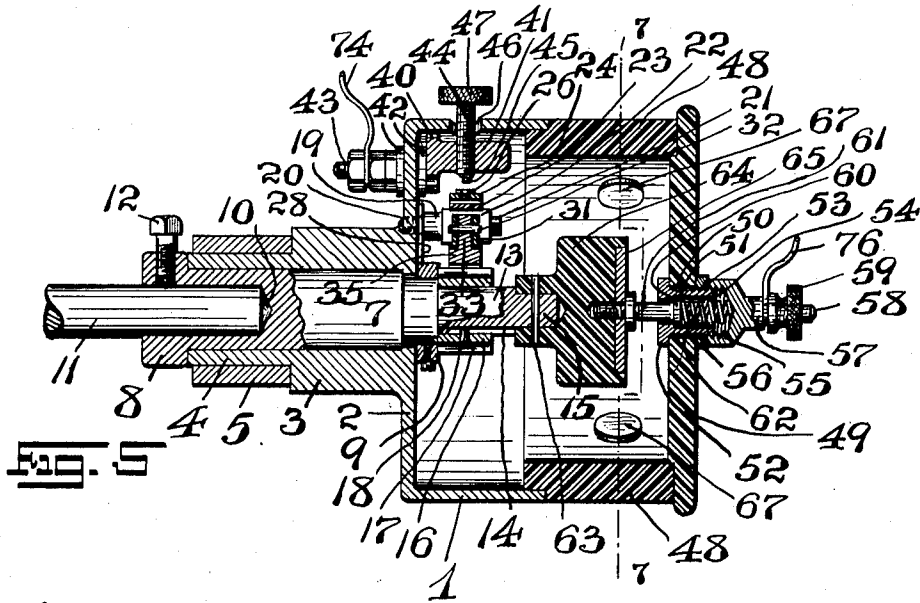
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ATTORNEYS

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WITNESSES:
Harry E. Pfeiffer
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INVENTOR:
JAMES M. SMITH,
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UNITED STATES PATENT OFFICE.

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CURRENT DISTRIBUTER AND TIMER.

1,064,177.

Specification of Letters Patent. Patented June 10, 1913.

Application filed May 17, 1912. Serial No. 697,879.

To all whom it may concern:

Be it known that I, JAMES M. SMITH, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Current Distributors and Timers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to characters of reference marked thereon, which form a part of this specification.

The present invention relates, generally, to improvements in timing and distributing mechanisms for the ignition system of internal combustion engines; and, the present invention has reference, more particularly, to a novel construction of automatic timing and distributing mechanism for controlling an electrical current to intermittently make and break the electric circuit thereof, and successively connect the sparking terminals of a plurality of engine-cylinders with the source of generation of said electric current, so as to successively ignite or explode the charges of gas within the cylinders of the engine.

The present invention has for its principal object to provide a novel, simple and effective mechanism of the character above set forth, adapted to be geared with the main shaft of an explosive-engine in such a manner, so that its parts move in a proper time-relation to the movements of the different pistons in the respective cylinders; and, in so doing, properly time and distribute the electric current successively to the sparking terminals.

A further object of the present invention is to provide an ignition system mechanism which is of such construction that the making and breaking devices which control the electric current will only operate when the main shaft of the engine turns or rotates in the proper or normal direction.

Other objects of this invention not at this time more particularly enumerated, will be clearly evident from the following detailed description of the said invention.

With the various objects of the present invention in view, the said invention consists, primarily, in the novel electric current

timing and distributing mechanism herein-after set forth; and, the invention consists, furthermore, in the novel arrangements and combinations of the various devices and the parts thereof, as well as in the details of the construction of the same, all of which will be more fully described in the following specification, and then finally embodied in the clauses of the claim which are appended to and which form an essential part of the said specification.

The invention is clearly illustrated in the accompanying drawings, in which:—

Figure 1 is a diagrammatic view of an ignition system showing in proper electrical connection therewith, a novel timing and distributing mechanism, the latter being illustrated in side elevation, and made according to and embodying the principles of the present invention. Fig. 2 is an interior plan view of the internal make and break mechanism; Fig. 3 is a similar view showing the normal operation of the make and break mechanism; and Fig. 4 is another similar view showing the manner in which said make and break mechanism is prevented from closing the circuit, when the main shaft of the engine seeks to turn or rotate in the wrong direction. Fig. 5 is a longitudinal vertical section, taken on line 5—5 in said Fig. 2, looking in the direction of the arrow *x*, the additional distributing mechanism being also shown. Fig. 6 is a detail vertical cross-section, taken on line 6—6 in said Fig. 2, looking in the direction of the arrow *y*; and Fig. 7 is a detail transverse section, taken on line 7—7 in Fig. 5, said view illustrating more particularly the distributing mechanism.

Similar characters of reference are employed in all of the above described views, to indicate corresponding parts.

Referring now to the several figures of the drawings, the reference-character 1 indicates a casing which is adapted to contain and support the novel timing and distributing mechanism. Preferably integrally connected with said casing 1, and being centrally disposed and extending outwardly from the back 2 thereof, is a tubular hub 3 which is provided with a reduced extension 4 adapted to receive a yoke-member or collar 5, said member or collar being provided with a supporting arm or bracket 6 for its connection with the frame or casing of the in-

ternal combustion engine, and for the purpose of supporting said casing in proper connection therewith. Journaled in said tubular hub 3, so as to rotate therein, as in a bearing, is a spindle 7 which is provided at its outer end with an enlarged head 8, which forms a shoulder abutting against the outer end of said reduced extension 4 and thereby preventing any longitudinal movement of the said spindle 7 in an inward direction. The said spindle 7 extends within the interior of the said casing 1, and is provided with a collar 9, suitably secured thereto, which engages the back 2 of said casing 1, so as to prevent any longitudinal movement of said spindle 7 in an outward direction. The outer end of said spindle 7 is provided with a receiving socket or opening 10, adapted to receive one end of a counter-shaft 11, which is usually geared so as to be driven from the main driving shaft of said engine, and whereby said spindle 7 is rotated in proper relative time to the movement or rotation of said main driving shaft of the engine. Said counter-shaft 11 is secured in its properly coupled relation with the said spindle 7 by means of a set-screw 12, or any other suitable means. The inner end of said spindle 7 is also provided with a reduced extension, as 13, having a longitudinally extending key-way or groove 14 in its outer surface; and, connected with the free end of said extension 13 is a still further reduced portion, forming a stud or shank 15. Connected with said reduced extension 13, so as to be rotated thereby, is a cam-member 16 which is provided with a plurality of outwardly projecting cam-points 17, said cam-member 16 being provided with a key or pin 18 which is arranged so as to project into the said key-way or groove 14 of the extension 13, whereby the properly connected relation of the said cam-member with said extension 13 is obtained.

The reference-character 19 indicates a fulcrum-post, said post being provided with a screw-threaded shank 20, so as to be adapted to be screwed into a suitably screw-threaded opening, prepared for its reception, in the back 2 of the casing 1. The free end of said fulcrum-post is provided with a pivot-stud 21 upon which is pivotally mounted the supporting block 22 of a make and break device. Suitably secured upon the said supporting block is an outwardly extending bracket or arm 23, and suitably connected therewith, is a spring-plate 24, said spring-plate 24 paralleling the said bracket or arm and being slightly off-set therefrom so as to give room for the exercise of its spring-function or yieldableness. The end of the said bracket or arm 23 is doubled upon itself so as to form a retaining finger 25 which serves to limit the outward movement or spring of said spring-plate 24. Connected with the

said spring-plate, in a suitable location, preferably adjacent to its free end, is a contact-point 26, preferably made of platinum, or other suitable material. Connected with said bracket or arm 23 is a right-angled extension forming a stop-arm 27, projecting from the fixed end of the said bracket or arm 23 and extending across the end-surface of said supporting-block 22. Secured upon the back 2 of said casing 1 is the base-piece 28 of an upwardly projecting stop-projection 29, which is adapted to be engaged by the said stop-arm 27 to limit the pivotal movement of said bracket or arm 23 and the said spring-plate 24, in one direction, whereby its normal position is located. Secured upon the opposite side of said supporting block 22, to that upon which said bracket or arm 23 is attached, is an outwardly extending lever or arm 30 which is provided at its free end with a pair of horizontally extending and perforated ears 31, adapted to support a vertically disposed pintle-pin 32. Pivotally mounted upon said pintle-pin 32 is a pawl-member 33 provided with a cam-like nosing 34. Said pawl-member 33 is also formed with suitable shoulders 35 upon its upper and lower sides which in their engagement with the rear edges of said perforated ears 31 prevent the said pawl-member 33 from oscillating or yielding in one direction. Extending outwardly from said pawl-member 33 is a perforated ear or lug 36 adapted to receive the one end of a coiled spring 37, the other end of which is secured to an anchor-post 38 fixed upon the inner surface of the back 2 of said casing 1, by means of a screw 39. The said spring 37 serves the double purpose of maintaining in and returning to normal position both said pawl-member 33 and said lever-arm 30, as well as said bracket or arm 23 and said spring-plate 24.

The reference-character 40 indicates the base-plate of a carrier-post 41, the same being secured to the inner side of the back 2 of said casing 1, but being insulated therefrom by suitable sleeves and washers 42 of suitable insulating material. Connected with the said plate 40, in such a manner so as to permit of its projection from the exterior of the casing 1, is a binding-post 43, whereby a suitable electrical connection for the passing to said ball-plate 40 and its carrier-post 41 of an electric current is provided. Adjustably connected with said carrier-post 41 is a contact-screw 44, the inner end of which is provided with a suitable contact-point 45, preferably made of platinum, or other suitable material. The shank of said contact-screw 44 projects outwardly through said casing 1, the latter being provided with a suitable hole or opening 46 adapted for such purpose, and the outer end of said contact-screw 44 being provided

with a head or fingerpiece 47, whereby the same may be properly adjusted so as to present its contact-point 45 in proper relation to the contact-point 26 of the spring-plate 24 herein-above described. Suitably connected with the outer end of said casing 1 is a cylindrical casing 48 which is provided with a cover-plate 49, said casing 48 and cover-plate 49 being made of some suitable insulating or suitable non-conductor of electricity. The said cover-plate 49 is provided with a centrally disposed perforation or opening 50 in which is arranged a tubular member or sleeve 51, provided with an annular flange 52 bearing upon the inner surface of said cover-plate 49, said sleeve 51 being also formed with an externally screw-threaded part 53 and an internally enlarged portion or opening 54. A chambered, or hollow nut-shaped body 55 is screwed upon the said externally screw-threaded part 53, against a screw-threaded washer 56 also screwed upon said externally screw-threaded part 53, so as to bear against the outer surface of said cover-plate 49. The said nut-shaped body 55 is provided with an outwardly extending portion 57 at the extreme end of which projects a reduced screw-threaded shank 58 upon which is screwed a nut-piece 59, and by means of which an electric conductor or wire may be attached thereto. Arranged within the internally enlarged portion or opening 54 of said sleeve 51 is the head 60 of a contact-plug or brush 61, a coiled spring 62 being arranged back of said head 60 to press the said plug or brush 61 outwardly, so as to compel the same to make electrical contact with certain parts of the distributing mechanism about to be described.

Connected with the said stud or shank 15 of the spindle 7, by means of a transverse pin 63, or other suitable fastening means, is a hub-member 64, the same being made of some suitable insulating material. The outer end of said hub-member 64 is provided with a recess or socket which is adapted to receive the disk-portion 65 of a metallic contact armor brush 66, the said disk-portion being secured in any suitable manner to said hub-member, so as to turn or rotate therewith. Secured upon the inner side of the said casing 48 are a plurality of contact-points or disks 67, the same being provided with screw-threaded shanks 68 which project through and outwardly from the said casing 48, and provide in connection with nut-members 69, suitable binding-posts to which are secured the wires or electrical conductors 70 which lead to sparking terminals arranged within the several cylinders of the internal combustion engine, in the usual manner. Said brush 66 when rotating, successively contacts with the respective contact-points or disks 67, to success-

sively distribute to the sparking terminals, the electrical current for producing the ignition-spark. The previously mentioned plug or brush 61 is also adapted to make constant contact with said contact-arm or brush 66.

The reference-character 71 indicates a battery, or other source of electrical energy, and the reference-character 72 indicates an induction or spark-coil, the respective binding posts 73 of the primary circuit of which are respectively connected with the said battery 71 and said binding-post 43, by means of the primary circuit wires 74, the completed primary circuit being made through the ground and the conductor or wire 74' leading back to the battery 71. The binding post 75 of the secondary circuit of said coil 72 is connected, by means of the circuit-wire or conductor 76, with the screw-threaded shank 58 forming the binding post of the mechanism of said plug or brush 61, whereby the secondary or induced current is passed to said contact-arm or brush 66 and finally distributed to the spark-terminals of the internal combustion engine, as above mentioned.

Having thus described the general construction of the novel automatic timer and distributor, I will now briefly set forth its use and operation. The battery 71, in generating the electrical current, passes the same through the conductor 74 and the primary circuit of the coil 72 into the binding post 43, base-plate 40, carrier-post 41, and contact-screw 44. The spindle 7 being rotated in proper time and speed-relation by the main shaft of the internal combustion engine, causes a rotation of said cam-member 16 in the direction of the arrow *a* in Fig. 2, and consequently the cam-points 17 are brought into contact with the cam-nosing 34 of the pawl-member 33. When so engaged, any pivotal movement of said pawl-member 33 upon its pintle-pin 32 is resisted, since the shoulders 35 thereof are caused to press against the edges of said perforated ears 31 of the lever-arm 30. Consequently the lever-arm 30 itself is pushed forward, which turns or oscillates said supporting-block 22, and thereby carries said bracket-arm 23 and its spring-plate 24 forward, so that the contact-point 26 of the latter is brought into contact with the contact-point 45 of said contact-screw, the said spring-plate 24 yielding to the pressure of the said contacting points. Contact having thus been made, the electrical current passes into said spring-plate 24, bracket or arm 23, supporting block 22, and thence through the fulcrum-post 19 to the casing 1, and through the interconnecting parts to the frame-work of the engine which provides a ground, the current being thence conducted through the conductor 74' back to the bat-

tery, thereupon completing the primary circuit of the coil 72. The secondary current induced in the coil 72 is delivered through the conductor 76 to the mechanism of the brush 61, the latter delivering the same to the contact-arm 66 which distributes the current to the proper spark-terminal, as herein-above indicated, and in a manner clearly understood by those skilled in the art to which this invention appertains. As the cam-point 17 moves away from engagement with said pawl-member 33, the coiled spring 37, which has been placed under tension by the swinging or forward movement of said lever-arm 30, pulls said pawl-members, lever-arm, and supporting-block 22, together with said bracket or arm 23 and spring-plate 24, back to their normal initial positions, thereby breaking the primary circuit. Thus, the successive engagement of said cam-points 17 with said pawl-member, when the former are rotated in a proper direction, causes an intermittent making and breaking of the primary circuit and a consequent generation of the secondary current which is properly distributed to the sparking-terminals in accordance with the needs of the engine.

One of the important features of the novel construction of make and break mechanism is that the coiled spring 37 is normally under little or no tension, except when contact is made, thereby decreasing the strain, and wear and tear upon the same, and increasing its life and efficiency, whereby the danger of disorder or inoperativeness of the make and break mechanism is greatly decreased or obviated.

If, perchance, the main shaft of the engine is rotated, by reason of any cause, in a direction opposite to its normal and operative direction of rotation, the said cam-points 17 are brought into contact with the opposite face of the pawl-member 33, and the same is caused to oscillate upon the pintle-pin 32 without moving forward or swinging said lever-arm 30, thus preventing any closing of the primary circuit by reason of the operation of said make and break mechanism. In other words, the pawl-member 33 yields to and permits the passage of the said cam-points 17. The coiled spring 37 always returns the pawl-member to its normal position, when such yielding of the same has taken place.

From the foregoing description of the present invention, it will be clearly evident, that I have produced a novel and automatic device for controlling, timing, and distributing electrical energy to the sparking-terminals of an internal combustion engine; and, it will be readily understood, that changes may be made in the general arrangements and combinations of the various devices and parts, as well as in the details of the con-

struction of the said parts, without departing from the scope of the present invention, as set forth in the foregoing specification and as defined in the clauses of the claim which are appended thereto. Hence, I do not limit my invention to the exact arrangements and combinations of the various devices and parts as herein set forth, and as illustrated in the accompanying drawings, nor do I confine myself to the exact details of the construction of the said parts.

I claim:—

1. In a device of the kind described, a stationary contact device, a movable contact device, a lever-arm connected with said movable contact device, a pawl-member pivotally connected with said lever-arm, said pawl-member being yieldable in one direction, and means adapted to intermittently engage said pawl-member to operate said movable contact device.

2. In a device of the kind described, a stationary contact device, a movable contact device comprising a fulcrum post, a supporting block pivotally mounted upon said fulcrum-post, a yieldable contact device secured to said supporting block, a lever-arm secured to said supporting block, a pawl-member pivotally mounted at the end of said lever-arm, means upon said pawl-member for engaging said lever-arm when said pawl-member is pressed in one direction, said pawl-member being yieldable when pressed in the opposite direction, and a rotating cam-member adapted to engage said pawl-member.

3. In a device of the kind described, a casing, a spindle rotatably arranged in said casing, a cam-member secured to said spindle, said cam-member having cam-points, a fulcrum-post mounted within said casing, a movable contact making and breaking device, means for supporting said contact making and breaking device upon said fulcrum-post, a lever-arm connected with said supporting means, a pawl-member pivotally arranged in the end of said lever-arm, said pawl-member being provided with shoulders in engagement with said lever-arm, a perforated lug connected with said pawl-member, a coiled spring connected with said lug, means for anchoring said spring within said casing, a cam-nosing connected with said pawl-member adapted to be engaged by the cam-points of said cam-member to oscillate said lever-arm and said contact making and breaking device when said cam-member is rotated in a normal direction, said pawl-member yielding to said cam-points when said cam-member is rotated in an abnormal direction, and means insulated from said casing for receiving the contact of said movable contact making and breaking device.

4. In a device of the kind described, a casing, a spindle rotatably arranged in said casing, a cam-member secured to said spindle, said cam-member having cam-points, a
 5 fulcrum-post mounted within said casing, a movable contact making and breaking device, means for supporting said contact making and breaking device upon said fulcrum-post, a lever-arm connected with said supporting means, a pawl-member pivotally
 10 arranged in the end of said lever-arm, said pawl-member being provided with shoulders in engagement with said lever-arm, a perforated lug connected with said pawl-member, a coiled spring connected with said lug,
 15 means for anchoring said spring within said casing, a cam-nosing connected with said pawl-member adapted to be engaged by the cam-points of said cam-member to oscillate
 20 said lever-arm and said contact-making and breaking device when said cam-member is rotated in a normal direction, said pawl-member yielding to said cam-points when said cam-member is rotated in an abnormal
 25 direction, means insulated from said casing for receiving the contact of said movable contact making and breaking device, comprising a base-plate provided with a carrying post secured upon and within said casing,
 30 but electrically insulated therefrom, a contact-screw adjustably supported by said carrying-post, and a binding-post connected with said base-plate for connecting said contact-screw in a primary electrical circuit.
 35 5. In a device of the kind described, a casing, a spindle rotatably arranged in said casing, a cam-member secured to said spindle, said cam-member having cam-points, a fulcrum-post mounted within said casing, a
 40 movable contact making and breaking de-

vice, means for supporting said contact making and breaking device upon said fulcrum-post, a lever-arm connected with said supporting means, a pawl-member pivotally
 45 arranged in the end of said lever-arm, said pawl-member being provided with shoulders in engagement with said lever-arm, a perforated lug connected with said pawl-member, a coiled spring connected with said lug,
 50 means for anchoring said spring within said casing, a cam-nosing connected with said pawl-member adapted to be engaged by the cam-points of said cam-member to oscillate said lever-arm and said contact making and
 55 breaking device when said cam-member is rotated in a normal direction, said pawl-member yielding to said cam-points when said cam-member is rotated in an abnormal direction, means insulated from said casing for receiving the contact of said movable
 60 contact making and breaking device, comprising a base-plate provided with a carrying post secured upon and within said casing, but electrically insulated therefrom, a contact-screw adjustably supported by said
 65 carrying-post, and a binding-post connected with said base-plate for connecting said contact-screw in a primary electrical circuit, and means co-acting with said make and break mechanism for distributing a secondary
 70 electrical circuit to the sparking-terminals of an internal combustion engine.

In testimony, that I claim the invention set forth above I have hereunto set my hand this sixth day of April 1912.

JAMES M. SMITH.

Witnesses:

JOSEPH M. BAKER,
 CHAS. A. MAGRUDER.