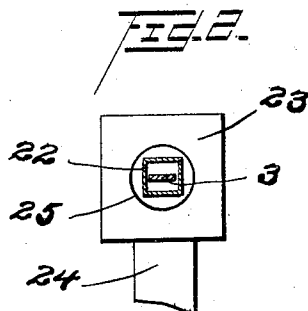
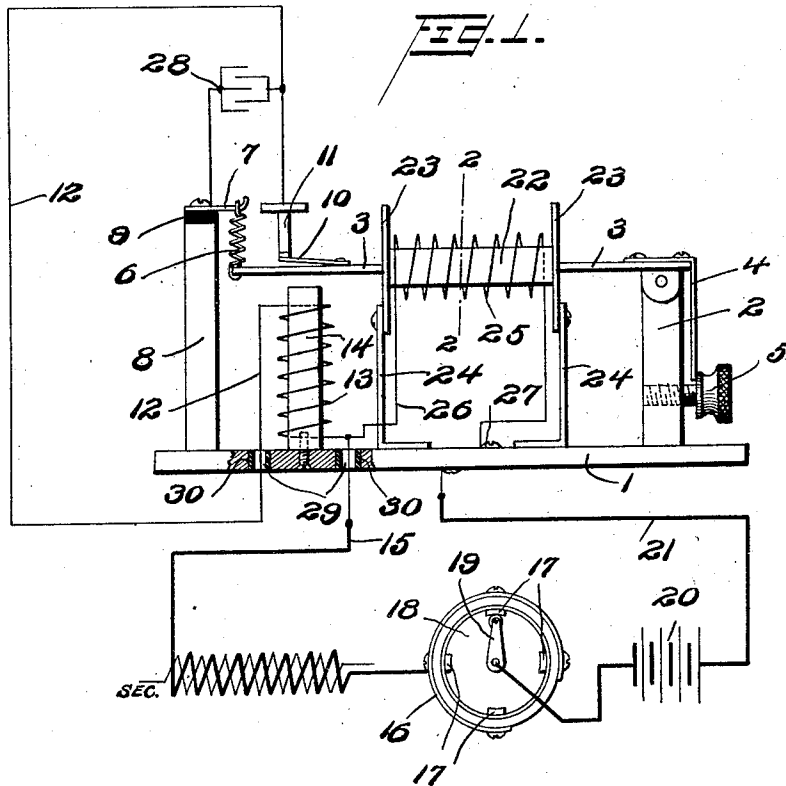


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 SPARK PRODUCING MECHANISM FOR INTERNAL COMBUSTION ENGINES.  
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Witnesses

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# UNITED STATES PATENT OFFICE.

LEWIS T. RHOADES, OF MONT CLARE, PENNSYLVANIA.

SPARK-PRODUCING MECHANISM FOR INTERNAL-COMBUSTION ENGINES.

1,057,009.

Specification of Letters Patent.

Patented Mar. 25, 1913.

Application filed November 7, 1912. Serial No. 729,937.

*To all whom it may concern:*

Be it known that I, LEWIS T. RHOADES, a citizen of the United States, residing at Mont Clare, in the county of Montgomery and State of Pennsylvania, have invented certain new and useful Improvements in Spark-Producing Mechanism for Internal-Combustion Engines, of which the following is a specification.

My invention relates to improved spark producing mechanism for internal combustion engines, the object of the invention being to so control the spark that a single spark of the same intensity is produced at each explosion in each cylinder regardless of the speed of the engine.

It is a well known fact that the first spark in a shower of sparks caused by an interrupter does the work of exploding the mixture and the other sparks are wasted. Various attempts have been made to prevent this waste, and to insure a single uniform spark at all speeds, but such means have been more or less complicated.

It is the purpose of my invention to provide an improved construction of electromagnetically actuated interrupter which so regulates the current flowing through the primary circuit that but one spark is produced for each explosion or ignition, and prevent the waste of electrical energy due to a shower of sparks common with ordinary sparking means, and also prevent sparking due to the arc which is caused by the movable contact piece of the timer, all of which will more fully hereinafter appear.

With these and other objects in view the invention consists in certain novel features of construction and combinations and arrangements of parts as will be more fully hereinafter described and pointed out in the claims.

In the accompanying drawings: Figure 1 is a diagrammatic view partly in section and partly in elevation illustrating my improvements, and Fig. 2 is a fragmentary view partly in elevation and partly in section on the line 2—2 of Fig. 1.

Referring to the drawings, 1 represents a metal base on which a post 2 is secured and pivotally supports at its upper end, an armature 3. This armature 3 at its pivoted end, is provided with a spring arm 4 engaged by a set screw 5 screwed into post 2 and tending to elevate the free end of said armature. The free end of this armature is

also connected by a coiled spring 6 with an arm 7 secured on the upper end of a post 8 and insulated therefrom by means of a block 9. These two springs 4 and 6 hold the armature in such position that its cushioned contact 10 engages a contact 11, and this contact 11 is connected by a wire 12 with a helix 13 around a core 14 constituting a magnet. The other end of the helix 13 is connected by a primary wire 15 with a metal band 16 electrically connected with all of the stationary contacts 17 on a timer 18, the movable member 19 of said timer connected with one side of a battery or other source of electricity supply 20, and the other side of said battery or electricity supply connected by a wire 21 to base 1. The armature 3 comprises a bar or strip of relatively flat metal which projects through an angular sleeve 22 of non-conducting material having disks 23 at its ends supported by brackets 24 on base 1. Around the sleeve 22, a helix 25 is located, connected in shunt with the circuit above described, the wire 26 at one end of the helix 25 being connected to wire 15 and the wire at the other end of the helix grounded into base 1 as indicated at 27. Between the arm 7 and wire 12, a condenser 28 is located, and all of the parts above described are illustrated diagrammatically, as it is to be understood that the particular arrangement is not essential, and furthermore it will be noted that the wires 12 and 15 are insulated from the base by sleeves 29 projected through openings 30 in the base, and through which the wires pass.

In operation, when the circuit is closed by the timer 18 through the medium of contacts 19 and 17, the magnet 13 will be energized and draw down armature 3, instantly opening the circuit including the magnet 13, and at the same time energizing the armature 3 by reason of the helix 25 which is included in shunt. In other words, the part 14 which formerly constituted the core of the magnet 13, now operates merely as a bar of iron, so that the armature now constituting a magnet is drawn to this bar of iron because of its pivotal mounting, or rather is held to the bar 14 as it was previously drawn thereagainst when the bar 14 constituted a core. This armature now constituting a magnet will hold itself in this position until the circuit is broken at the timer, when the parts will return to the position indicated. It will therefore be

noted that I include in an unbroken circuit with the primary winding, two electromagnets both in closed magnetic circuit, which can be traced as follows: When the timer closes the circuit, the current flows from one side of the battery 20 through wire 21 to base 1, thence through post 2, armature 3, contacts 10 and 11, wire 12, magnet 13, wire 15, timer 18 to the other side of the battery. This energizes magnet 13 and draws armature 3 downwardly against the end of core 14. Instantly this circuit is broken, so that but a single spark is had in the engine cylinder, and as soon as this circuit is broken by the separation of contacts 10 and 11, part 14 ceases to operate as a core and becomes merely a bar of iron. Instantly by reason of the shunt circuit, the helix 25 is included in the circuit above described, energizing the armature 13 and causing the same to become an electro-magnet which is attracted to the bar 14 and held in this position until the circuit is broken at the timer, when the springs 6 and 4 return the armature to its former position.

It is to be borne in mind that the armature 3 does not contact with the sleeve 22, and is thoroughly insulated from the helix 25. The armature 3 therefore operates as a movable magnet, holding itself against the bar 14 when the latter ceases to operate as a core, so that the magnet is attracted thereto. It will thus be seen that I utilize in the primary winding, a stationary electro-magnet and include in shunt therewith a movable electro-magnet, the former causing the initial break in the circuit to create a single spark, and the latter maintaining the circuit open to prevent but a single spark, and prevent loss in electrical energy. It will be further noted that in my particular construction a complete magnetic circuit is obtained for either or both of my electro-magnets which makes necessary but a very small amount of wire on the magnets. This is of tremendous importance, as it is well known that the induction of resistance in the primary circuit causes more or less reluctance which has a detrimental effect on the spark produced by the secondary of the induction coil. Hence my improved arrangement of parts economize in material and the simplified arrangement produced not only improved electrical results, but result in economy structurally as well as electrically.

Various slight changes might be made in the general form and arrangement of parts described without departing from my invention, and hence I do not limit myself to the precise details set forth, but consider myself at liberty to make such changes and alterations as fairly fall within the spirit and scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The combination of a primary circuit, a secondary circuit, means for making and breaking the primary circuit, and means for interrupting the current in the primary circuit comprising a stationary magnet included in circuit with the primary circuit, and a movable magnet included in shunt with the primary circuit, substantially as described.

2. The combination of a primary circuit, a secondary circuit, means for making and breaking the primary circuit, and means for interrupting the current in the primary circuit comprising a stationary magnet included in circuit with the primary circuit, a pivoted armature constituting a circuit closing means for the said magnet, and means for magnetizing the armature when drawn against the first-mentioned magnet, substantially as described.

3. The combination of a primary circuit, a secondary circuit, means for making and breaking the primary circuit, and means for interrupting the current in the primary circuit comprising a stationary magnet included in circuit with the primary circuit, a pivoted armature constituting a circuit closing means for the said magnet, a helix included in shunt with the primary circuit, said helix around the armature and insulated therefrom, whereby when said first-mentioned magnet moves the armature to open the circuit, said helix will cause the armature to become a movable magnet and hold itself against the core of the first-mentioned magnet, substantially as described.

4. The combination of a primary circuit, a secondary circuit, means for making and breaking the primary circuit, means for interrupting the current in the primary circuit, and a movable magnet included in shunt with the primary circuit and adapted to hold the primary contacts apart after they have been caused to interrupt the primary circuit, substantially as described.

5. An interrupter of the character described, comprising a base, a post on the base, an armature pivotally connected to the post, a stationary contact, a contact on the armature normally in engagement with the stationary contact, said contacts, armature post, and base included in a normally closed primary circuit including a timer and a source of electricity supply, an electro-magnet supported on the base and included in said circuit, said electro-magnet adapted when the circuit is closed to draw the armature toward the same and open the circuit, and a helix included in shunt with the first-mentioned circuit, said helix around the armature and insulated therefrom, and adapted to energize the armature causing

the same to become an electro-magnet and hold itself against the core of the first-mentioned magnet, substantially as described.

5 6. An interrupter of the character described, comprising a base, a post on the base, an armature pivotally connected to the post, a stationary contact, a contact on the armature normally in engagement with the stationary contact, said contacts, armature  
10 post, and base included in a normally closed primary circuit including a timer and a source of electricity supply, an electro-magnet supported on the base and included in said circuit, said electro-magnet adapted  
15 when the circuit is closed to draw the armature toward the same and open the circuit, a helix included in shunt with the first-men-

tioned circuit, said helix around the armature and insulated therefrom and adapted to energize the armature causing the same  
20 to become an electro-magnet and hold itself against the core of the first-mentioned magnet, and springs at both ends of said armature adapted to move the armature to bring the contacts together when the timer  
25 opens the circuit, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

LEWIS T. RHOADES.

Witnesses:

P. W. KING,  
MARGARET BETZ.

" Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."