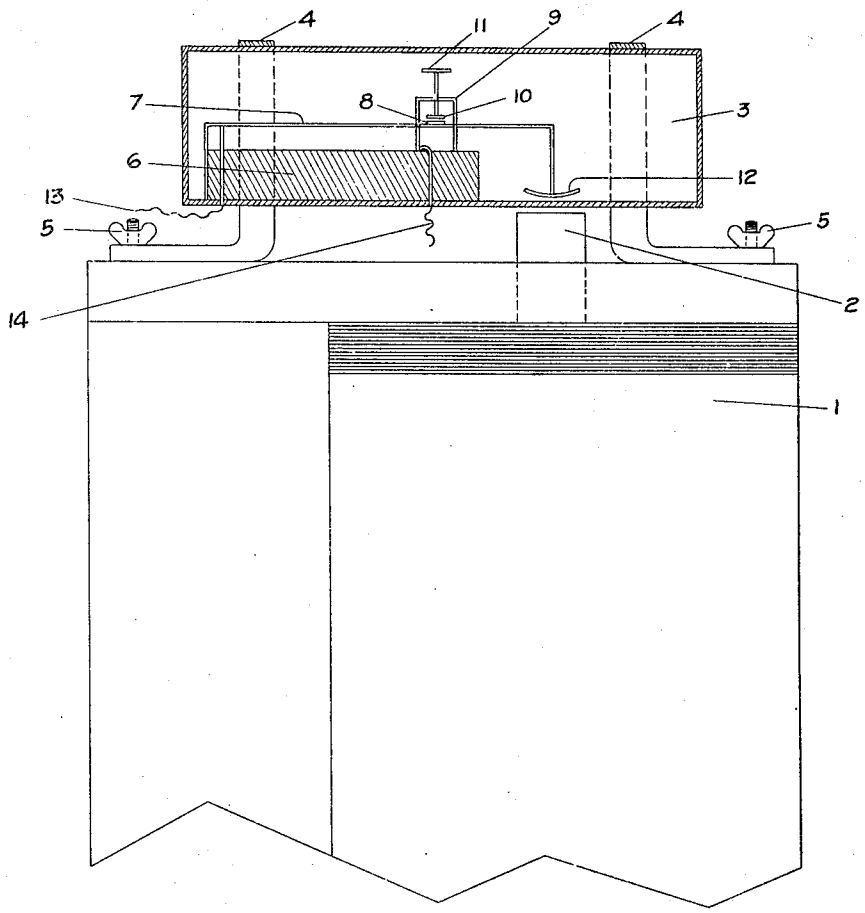
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F. C. PERREM

SPARK GENERATOR FOR INTERNAL COMBUSTION ENGINES

Filed Feb. 25, 1921



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SPARK GENERATOR FOR INTERNAL-COMBUSTION ENGINES.

Application filed February 25, 1921. Serial No. 447,841.

To all whom it may concern:

Be it known that I, FREDERICK CHANNON PERREM, a subject of the King of the United Kingdom of Great Britain and Ireland, residing at 20 Mount Merrion Avenue, Blackrock, in the county of Dublin, in that part of the United Kingdom called Ireland, have invented new and useful Improvements for Spark Generators for Internal-Combustion Engines, of which the following is a specification.

The invention relates to devices in which vibratory contacts are utilized, as for example, Ruhmkorff coils, or induction coils of other types, and more particularly to such devices that are used for supplying a high tension current for the ignition of internal combustion engines.

In connection with such apparatus, the contacts are alternatively made and broken at a very high rate, and even when they are used intermittently, the service demanded of them is exceptionally severe. It is one of the objects of my invention to provide a vibratory contact device that is not only reliable in operation, but durable as well, and without danger of undue or rapid deterioration of the contact points.

The main cause of wear or distortion of the contacts, is the sparking that usually occurs at each breaking of the contacts, which wears away or distorts the contact points, so that after a while the functioning of the device becomes materially poorer, and it must be repaired or replaced. I have found that this sparking may be substantially entirely eliminated upon the fulfillment of certain requirements, one being that upon an incipient separation of the contact points, a large resistance shall immediately exist between them. This I obtain by enclosing the contacts in an air tight space. In order to secure the resistance effect this space may be arranged to be filled with an inert gas, but I preferably exhaust the space to a high degree, since I find that in such an exhausted tube or space, the separation of the contacts even by a small amount, introduces a resistance between them of the desired order of magnitude. In order that the contacts may be sealed permanently in this receptacle, their operation is effected by a magnetic force originating externally of the tube. This arrangement is also of benefit in permitting the use of a compact and easily replaceable contact device.

If however no further provision be present than the means for introducing the high order of resistance between the contacts, when they separate, a substantial amount of sparking may yet occur. This is due to the fact that in such high tension systems, a secondary winding is provided in which a high tension current is induced by the rapid making and breaking of the primary circuit at the contacts; and there is a counterpart in the primary coil, of this secondary current which may be aptly termed the kick-back current. This current has a strong tendency to persist even after the contacts separate.

In order to prevent this flow of current across the contacts, I provide a parallel path therefor, in the form of a condenser which is connected across the contacts. This condenser thus serves to absorb the kick-back current.

As an example, without confining myself strictly thereto, I make reference to the accompanying drawing which shows a part sectional plan of my invention applied to an induction coil or transformer that is adapted to supply the ignition circuit for an internal combustion engine.

Referring to the drawing 1 is the induction coil or transformer, one end of the core of which is shown at 2.

At 3 is shown a tube of glass, metal or other suitable material, which, after insertion therein of the "make and break" arrangement is exhausted of air. Such exhaustion I find produces the desired high resistance between the separated contacts and is preferable to an arrangement utilizing an inert gas or gases.

The chamber 3 is connected by surrounding supports 4 and studs 5 with the primary winding of the coil 1.

Adapted to fit and retain its position in the chamber 3, is a "make and break" apparatus comprising a base 6 of fibre, glass, porcelain or any other suitable material, carrying at one end the suitably supported vibrator 7 having at, or near its free end the lower contact disc 8, over which disc is supported by a bridge 9 the top contact 10 carried by a screw 11 provided with a lock-nut by which the contacts can be ad-

justed so that, as already mentioned, a high tension spark or discharge may pass, when required, between the ends of the secondary winding of the induction coil or other apparatus.

The free end of the vibrator 7 has depending from it a soft iron or other suitable disc 12 so located within the chamber 3 that it will pick up magnetism from the core 2.

The vibrator 7 is connected with the primary winding and the condenser (which is not shown in the drawings) by a copper or platinum wire 13 fused into the glass or other material of the chamber 3, and the bridge 9 is connected with the condenser and one of the terminals by a copper or platinum wire 14 also fused into the chamber 3.

In the application of this invention to the ignition of the explosive mixture in an internal combustion engine, an ordinary induction coil could be employed, and on top of the box containing the windings could be removably held the exhausted chamber or receptacle containing the "make and break" device, the magnetism from the core of the coil passing through the glass or other wall of the chamber so that when the current is established, a secondary spark will be set up in the sparking plug. The condenser in the primary circuit provides an absorbing pass for the equivalent current tending to flow across the separated contacts.

The application of this invention to the ignition of the fuel of internal combustion engines would obviate the magneto with its complications, cost and liability to sulk for long or short periods for no apparent reason, with the disadvantage of affecting all the cylinders, whereas a unitary method of ignition which this invention affords has much to commend it provided the contacting parts are working under such conditions that they will endure for a very prolonged period without oxidizing or volatilizing, and without any attention or adjustment; and that, at the end of such a period, another chamber containing a "make and break" apparatus can be instantly fixed in the position previously occupied by the worn-out apparatus. The replacement of the chamber, moreover, by means of the studs 5 can be effected with great rapidity by an unskilled person. I am aware that vibratory generators operating on the same general principles as that described, have been used heretofore, for purposes other than the ignition of internal combustion engines; but such generators have been found incapable of use for this purpose, due to the large current that must be supplied to the ignition plugs, and to the extreme rapidity at which the contacts must operate to provide the high tension required. This problem has been solved by the use of the evacuated tube in which the contacts are not subjected to oxidation or other forms of burning; and by the use of the absorbing condenser, which insures against pitting or roughening of the contacts by absorbing the kick-back current.

Although platinum may be employed for the contacting parts of the invention, nevertheless, the invention enables silver, steel, or other cheap metals to be used, thus making for economy without detracting from the efficiency and life of those parts.

What I claim as my invention and desire to secure by Letters Patent is:—

1. The combination with the ignition coil of an internal combustion engine, of an interrupter mounted on the coil casing, said interrupter comprising a vibratory contact, an armature attached to said contact, an evacuated chamber, said contact and armature being enclosed in said chamber.

2. The combination with an ignition coil of an internal combustion engine, said coil having a magnetic core projecting through the coil casing, of an interrupter mounted on said casing and comprising a vibratory contact, an armature connected to said contact and adapted to be actuated by said magnetic core, and a vacuum chamber in which said armature and contact are enclosed.

3. The combination with an ignition coil of an internal combustion engine, of a vacuated chamber mounted on the coil casing adjacent the magnetic core of the coil, an interrupter comprising a vibratory contact, an armature actuated by the magnetic core and coil for operating said contact, said armature and contact being enclosed in said chamber.

In testimony whereof I have signed my name to this specification.

FREDERICK CHANNON PERREM.