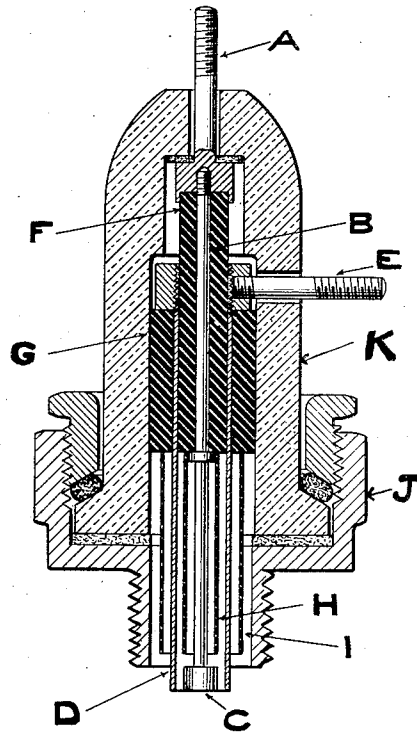


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IGNITION APPARATUS.
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1,177,043.

Patented Mar. 28, 1916.



Witnesses:
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UNITED STATES PATENT OFFICE.

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IGNITION APPARATUS.

1,177,043.

Specification of Letters Patent.

Patented Mar. 28, 1916.

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To all whom it may concern:

Be it known that I, WHARTON B. McLAUGHLIN, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Ignition Apparatus, of which the following is a specification.

The object of my invention is to provide an ignition system by which all the advantages of "double ignition" may be obtained with the magneto or coil employed in the usual single ignition system. The double ignition systems as now installed in some motors require a specially wound magneto and a duplex distributing system which adds so greatly to the cost of the motor that it can only be used in the higher priced cars.

In my improved igniting system I employ in each cylinder a two-pole spark-plug (that is, one having both its electrodes insulated from the metal of the motor) and an ordinary single pole plug in series in the usual ignition circuit and my invention comprises such ignition system, and also the construction of my special sparking plug by means of which such system can be successfully carried into effect.

In the accompanying drawing I have illustrated in vertical section the construction of my improved sparking-plug, but I have not illustrated the other elements of my ignition system as it will be understood that such elements may be of any approved construction such as employed in the usual single ignition system.

In the drawing A represents the binding post through which the current enters the plug. This binding post projects through the top of a cap or hood K here shown as formed of porcelain, and has a head within the hood so that it may be clamped in place by a lock nut (not shown) on the threaded end of the binding post. Depending from the head of the binding post is the central electrode of the plug, consisting of a rod B having at its lower end a head C which may be circular or angular as desired to provide a suitable sparking surface. Surrounding the rod B and spaced therefrom is a tube D whose lower end surrounds the head C and forms therewith the spark gap of the plug.

The rod B is insulated from the tube D by means of a sleeve of mica F supported on

the rod B between the head of the binding post A and a collar fast on the rod about midway of its length, and snugly fitting the tube D. The mica sleeve F is preferably formed by rolling sheets of mica of the proper width upon a mandrel and when it has been built up to about $\frac{1}{2}$ its final diameter a sheet or two of greater width is wound in so that the projecting edge of such sheet forms a thin tube H extending into the space between the rod B and tube D and out of contact with both such parts. The tube H of course terminates above the head C so as not to interfere with the spark gap.

Attached to the upper end of the sleeve D is a metal collar in which is set the binding post E projecting through the wall of the hood K and from which the current is conducted to the insulated electrode of the single pole plug of the system. The tube D is of smaller diameter than the bore of the hood and inserted between the tube and the hood is a mica sleeve G similar in construction to the sleeve F and having an extension tube I similar to the tube H and projecting from the lower edge of sleeve G midway between the tube D and the hood K.

The parts C, D, H and I project below the base of the hood K and into the bore of a screw threaded socket-plug J adapted to be set in the engine cylinder. The hood K is retained in the socket plug by means of a clamping sleeve threaded into the plug and engaging a flange on the lower edge of the hood, suitable packing washers being inserted on either side of the flange to provide a gas tight connection.

The purpose of the tubular extension H and I is to prevent short circuiting of the electrodes C and D or the electrode D and the ground connection J by the so-called "carbon" deposit which takes place on the exposed surface of the explosion chamber after the engine has been in service for a time. These tubes, while adding practically nothing to the diameter of the plug, interpose between the metal surfaces of the oppositely connected parts of the circuit, a surface extent equal to twice the length of the extensions. In spark plugs of standard size the bore of the plug J is about $\frac{3}{4}$ of an inch and I have found in practice that a plug having this bore and the other parts of the relative dimensions shown in the drawing will have sufficient surface between

its metal parts to prevent short circuiting of the plug even though the surface be "carbonized" as badly as ever occurs in practice.

One of the chief uses of my improved plug is in providing motors already employing a single ignition system with my novel double ignition system. For such purpose the plug must be adapted for use in the hole provided for the standard plug, and so far as I am aware I am the first to provide a plug having two insulated poles which can be made on the scale of the standard size plug and still provide sufficient surface between its electrodes to prevent short circuiting after an appreciable period of use.

In practically all motor vehicle engines as constructed today, the cylinders are provided with threaded holes for receiving priming cups as well as with the holes for the spark plugs and in connecting such motors to my double ignition system, I place my double pole plug in one hole, a single pole plug in the other, connect the high tension wire of the magneto to the post A, connect the post E to the insulated post of the single pole plug and make the usual ground connection between the engine and the magneto. The current will then simultaneously spark at the spark gaps of both plugs igniting the mixture at two different places.

If desired, instead of using the porcelain hood K, I may form the parts K and J from a single piece of metal and insulate the posts A and E with fiber or porcelain sleeves.

A further advantage of my plug which may be mentioned is the suspension of all the parts from the top of the hood so that they are free to expand downwardly from the heat of the explosion.

Having thus described my invention, what

I claim and desire to secure by Letters Patent is:

1. A spark plug comprising a tubular member for connection with a motor, a plurality of electrodes within said member, insulation between said member and said electrodes and between said electrodes, such insulation consisting of insulating material filling the space within said tubular member and surrounding the upper ends of the electrodes and downwardly extending sleeves surrounding said electrodes and out of contact on both surfaces with all conducting material.

2. A spark plug comprising a tubular member for connection with the motor, a tubular electrode within said member, a second electrode within said tubular electrode, insulating pieces between said member and said electrode, and between said electrodes, each piece consisting of a sleeve of insulating material filling the space between the upper ends of the adjacent parts and having a downwardly extending sleeve out of contact with both parts.

3. A spark plug comprising an outer tubular electrode, an inner electrode concentric therewith, insulation between said electrodes consisting of a tube of rolled sheets of mica filling the space between the upper ends of said electrodes, said tube having one or more sheets of greater width than the other sheets and forming a downwardly extending sleeve out of contact with both electrodes.

Signed at New York in the county of New York and State of New York, this 19th day of December, 1913.

WHARTON B. McLAUGHLIN.

Witnesses:

W. B. MORTON,

W. J. ROBINSON.