C. MESSERSCHMID.

IGNITER FOR INTERNAL COMBUSTION ENGINES.

APPLICATION FILED JAN. 6, 1911.

1,008,178. Patented Nov. 7, 1911.

Fig. 1.

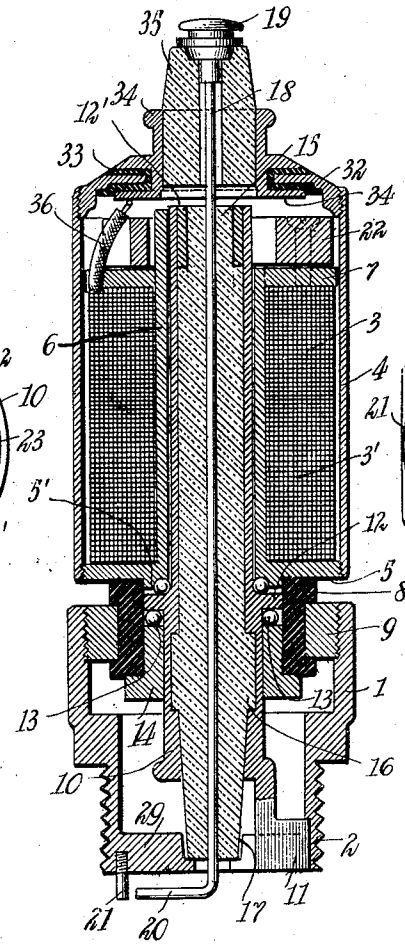


Fig. 2.

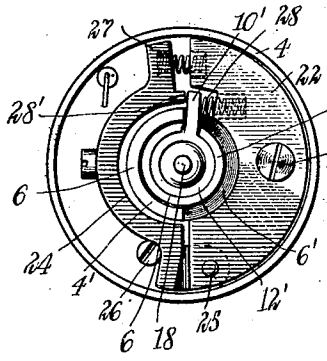
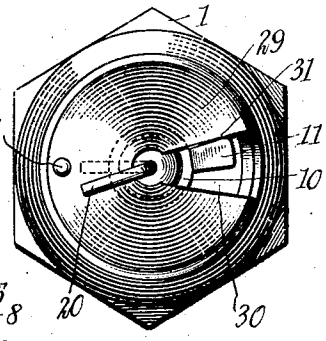


Fig. 3.



WITNESSES

Geo. Wm. Taylor

Wm. F. Nickel

INVENTOR

Carl Messerschmid

BY Munn & Co

ATTORNEYS

UNITED STATES PATENT OFFICE.

CARL MESSERSCHMID, OF NEW YORK, N. Y., ASSIGNOR TO THE DUPLEX MAGNETO AND SPARK PLUG COMPANY, OF BROOKLYN, NEW YORK.

IGNITER FOR INTERNAL-COMBUSTION ENGINES.

1,008,178. Specification of Letters Patent. Patented Nov. 7, 1911.

Application filed January 6, 1911. Serial No. 601,074.

To all whom it may concern:

Be it known that I, CARL MESSERSCHMID, a subject of the German Emperor, and a resident of the city of New York, borough of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Igniter for Internal-Combustion Engines, of which the following is a full, clear, and exact description.

My invention is an igniter or spark plug for gas and other internal combustion engines which is designed to operate both on high and low tension circuits. It is provided with a pair of jump spark electrodes and a pair of make-and-break spark electrodes which can be operated interchangeably, according to actual conditions. The movable make-and-break electrode is preferably operated by the action of an electromagnet which is incorporated with the plug structure. This electrode carries the high tension electrode which extends therethrough and terminates in proximity to a fixed spark point on the inner end of the plug.

The primary object of my invention is to provide ignition means comprising a movable low tension electrode and a high tension electrode so connected to the low tension electrode as to be moved in unison therewith when the low tension electrode is in operation. As a consequence, should the high tension electrode spark points ever become short-circuited by a bridge of carbon or soot or the like forming across the jump-spark gap so as to interrupt temporarily the working of the high tension current, all that will be necessary in order to break the bridge of short-circuiting material will be to switch over and throw the low tension electrode into operation. The low tension electrode through the high tension electrode moving in unison therewith will then break up and shake off the short-circuiting media which have collected to form a bridge across the jump-spark gap, and high tension sparking can then be resumed.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a longitudinal sectional view of my improved igniter; Fig. 2 is a top plan thereof with the cap removed; and Fig. 3 is a bottom plan of my igniter.

My improved spark plug, which, as before stated, is of the duplex or double-ignition type, comprises a hollow bushing 1, which is polygonal in form so that it can be engaged by a wrench or other tool, and terminates in a reduced screw-threaded extension 2, by means of which it can be attached to the cylinder of an engine. This bushing supports an electromagnetic coil 3 which is arranged on the outer end of the said bushing and is inclosed by a casing 4 which has a screw-threaded end 5. This screw-threaded end is centrally perforated and carries an inward extending boss 6, between which and the inner wall of the casing 4 the turns of wire 3′ of the electromagnetic coil are placed.

7 is a disk serving as an end plate for the electromagnetic coil and fitting around the boss 6 adjacent its inner end or top.

The casing bearing the coil 3 is connected to the bushing 1 by means of an insulating collar 8, which is mounted in fixed relation to a nut 9, which screws into the internal threads in the outer end of the bushing 1. The nut 9 fits into a groove on the outer surface of the insulating collar 8 so that the insulating collar 8 and the nut 9 are held firmly together, and the casing 4 has a central flange 5′ projecting from the end 5, which fits snugly into the insulating collar 8 and holds the casing 4 in place.

The movable make-and-break electrode is shown at 10, and it comprises a tubular member received by the sleeve 6 and terminating at one extremity in a movable electrode point 11. This movable electrode has an annular flange 12 intermediate its ends, and on either side of this flange are antifriction balls 13, the balls on the outer side of this flange on Fig. 1 being held in place by the end 5 of the casing 4, and the balls on the inner or lower side of this flange being held in place by means of a gland 14 which fits tightly into the inner end of the bore through the collar 8. This construction permits the electrode 10 to rotate freely in the hollow bushing 1, as well as in the casing of the electromagnetic coil 4.

As stated above, the rotatable make-and-break electrode 10 is hollow, and the longi-

tudinal bore thereof receives an insulating sleeve 15. This sleeve 15 has a circumferential collar 16 adjacent its inner extremity, and beyond this collar the surface 17 of this insulator sleeve is made conical, as shown, and fits snugly within the inner end of the bore through the electrode 10. The electrode 10 is cast or otherwise secured in place on the insulator sleeve 15 and forms therewith a single structural unit.

Passing longitudinally and centrally through the insulating sleeve 15 is a high tension electrode stem 18, that fits into a head 19 which is designed to be attached to the secondary wire of a magneto or induction coil. The inner end of the electrode stem 18 passes out through the inner end of the sleeve 15 and is bent at 20, at right-angles, to form a jump spark point. This spark point 20 coöperates with a fixed point 21 which is screwed into the inner end of the bushing 1.

The movable electrode 10 is operated by the action of the magnetic coil 3 upon a suitable armature contained by the casing 4. This armature is attracted by a pole piece 22, which is semi-circular in form and is fixed by means of a screw or bolt to the end plate 7. The armature is shown at 24 and is preferably curved in form and pivoted to the end plate 7 at 25.

26 is a stop pin or bolt in the end plate 7, which limits the movement of the armature away from the pole piece, and 27 is a compression spring fitting in recesses in the end of the armature 24 and the adjacent face of the pole piece 22, which holds the armature in its extreme outer position against the stop 26.

The boss 6 has a cutaway portion 6′ at its end adjacent the plate 7, to afford space for lateral play to an arm or projection 10′, on a ring 12′ fixed in the end of the rotatable electrode 10. This projection 10′ is engaged by a compression spring 28 fitting into a recess in the pole piece 23, which normally acts upon the projection 10′ in such a way as to hold the electrode point 11 in contact with a fixed electrode on the inner end of the bushing 1.

28′ is a projection or knob on the armature, by which the radial arm 10′ is engaged when the coil 3 is energized and the armature attracted.

The inner end of the bushing 1 is provided with an end wall 29, in which is formed a notch or opening 30. This notch or opening has radial sides 31, and against one of these sides the electrode point 11, attached to the electrode 10, is normally pressed by the spring 28′, above mentioned.

The top of the casing 4 is closed by a cap 32. This cap 32 receives an annular terminal 34 which is made of metal but insulated from the cap 32 by means of insulation 33. The terminal 34 is tubular and receives a round piece of insulation 35 which has a longitudinal perforation through which the outer end of the high tension electrode stem 18 passes.

It will be noted that the bushing 1 and the electrodes 10, 20 and 21 are of any suitable metal. The casing 4, the end 5 and the inner boss 6 are preferably made of magnetic metal, as well as the pole piece 23 and the armature 24. The cap 32, however, as well as the terminal 34 should be made of some metal which is non-magnetic so that the magnetic circuit may be completed through the pole piece and armature which the cap 32 covers.

In operation, if low tension current be employed, the conducting wire is connected to the terminal 34. Current passing over this wire is led to the coil 3 by means of wire 36, and after traversing the said coil passes to ground because the inner end of said coil is connected to the metal frame of the igniter in the usual manner. The current energizes the coil 3 and causes the pole piece 22 to attract the magnet 24. The magnetic attraction overcomes the spring 27, pulling the armature 24 suddenly inward. As a result, the projection 28′ strikes the radial arm 10′ a sudden blow which temporarily overcomes the operative action of the spring 28 and causes the tubular electrode 10 to rotate on its longitudinal axis. This rotation moves the electrode point 11 away from the radial edge 31 of the opening 30, against which the action of the spring 28 normally holds it. The moment the electrode point 11 is separated from the edge 31 the circuit is broken, the spark is drawn and the charge in the engine cylinder is ignited, as is usual in devices of this sort.

Should the low tension electrodes of my igniter become foul or otherwise get out of order the igniter can be used as a high tension igniter by merely sending secondary current to the head 19. A jump spark will then be obtained at the proper instant between the points 20 and 21.

Preferably, the head 19 is made separate from the stem 18 for convenience in assembling the parts together. When the cap 32 bearing the terminal 34 is screwed into the casing 4, the insulation 35 carrying the terminal head 19, causes this head 19 to engage the stem 18, and fits it down over the end thereof, thus forming a good electrical connection. At the same time the end of the stem 18 rotates freely in the head 19. The casing 4 with its contents has a tight fit in the bushing 1 because of the flange 5′ fitting into the outer end of the collar 8.

It will be noted that the stem 18 is fixed to the tubular electrode 10 by means of the insulation 15. When the electrode 10 turns, the stem 18 turns with it. As a result any

soot or oil bridging the points 20 and 21 will be shaken off. By means of this construction, should the high tension electrode get fouled and stop working the operator can at once switch over to low tension, and the tubular electrode in its working movements, then causes the electrode points 20 and 21 to destroy the short circuit between them and makes them fit for further use.

The wire 36 is a loose upstanding end of wire, and when the cap 32 is screwed in place, a flange 34′ on the terminal 34 comes into contact with this end of the coil 3. In this way the circuit to the coil 3 is completed.

My duplex plug is designed to be used in connection with my duplex magneto, which has a low tension armature to furnish current to the electrode points 11 and 31, and a high tension coil, to step up the armature current for the electrode points 20 and 21. An application for a patent on my duplex magneto, Serial Number 602,397, was filed on January 13, 1911.

Obviously, such changes in the shape and size of the parts as fairly come within the scope of my invention may be made when desired.

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

1. In a duplex igniter for internal combustion engines, the combination of a hollow bushing, a low tension electrode carried by said bushing, and a high tension electrode supported by said low tension electrode and insulated therefrom.

2. In a duplex igniter for internal combustion engines, the combination of a hollow bushing, a tubular low tension electrode carried by said bushing, a high tension electrode mounted in said low tension electrode and passing longitudinally therethrough, and an insulating sleeve carried by said low tension electrode and separating the high tension electrode therefrom.

3. In a duplex igniter for internal combustion engines, the combination of a hollow bushing, a rotatable tubular low tension electrode carried thereby, a high tension electrode supported by said low tension electrode and passing longitudinally therethrough, means for insulating said electrodes from each other, and electromagnetic means by which the low tension electrode is operated.

4. In a duplex igniter for internal combustion engines, the combination of a hollow bushing, a rotatable tubular low tension electrode carried thereby, a high tension electrode supported by said low tension electrode and passing longitudinally therethrough, means for insulating said electrodes from each other, an electromagnet supported by said bushing and surrounding the said rotatable tubular electrode, an armature coöperating with said magnet, and a radial projection from the outer end of said rotatable tubular electrode in position to be engaged by said armature when the coil is energized.

5. In a duplex igniter for internal combustion engines, the combination of a hollow bushing, a rotatable tubular low tension electrode carried by said bushing, a high tension electrode supported by said low tension electrode and passing longitudinally therethrough, means insulating said electrodes from each other, an electromagnet having a pole piece surrounding said rotatable tubular electrode, an armature cooperating with said tubular electrode, and a radial arm projecting from the outer end of said tubular electrode in position to be engaged by said armature when the coil is energized.

6. In a duplex igniter for internal combustion engines, comprising a hollow bushing, a rotatable tubular low tension electrode carried thereby, a high tension electrode supported by said low tension electrode and passing longitudinally therethrough, means for insulating said electrodes from each other, electromagnetic means carried by the plug for operating the low tension electrode, and independent terminals for said high tension and said low tension electrodes carried by said igniter for conducting current thereto.

7. In a duplex igniter for internal combustion engines, comprising a hollow bushing, a rotatable tubular low tension electrode carried thereby, a high tension electrode supported by said low tension electrode and passing longitudinally therethrough, means for insulating said electrodes from each other, means carried by the igniter for operating the low tension electrode, and independent terminals for said high tension and said low tension electrodes carried by said igniter for conducting current thereto.

8. In a duplex igniter for internal combustion engines, the combination of a hollow bushing, a rotatable tubular low tension electrode carried by said bushing, a high tension electrode supported by said low tension electrode and passing longitudinally therethrough, means for insulating said electrodes from one another, means for operating the low tension electrode, and independent terminals for said electrodes supported on said igniter, one of said terminals being tubular and the other terminal passing therethrough and being insulated therefrom.

9. In a duplex igniter for internal combustion engines, the combination of a hollow bushing, a low tension electrode carried by said bushing, and a high tension electrode carried by said bushing and movable with the said low tension electrode.

10. In a duplex igniter for internal combustion engines, the combination of a hollow bushing, a low tension electrode carried by said bushing, and a high tension electrode supported by said low tension electrode and insulated therefrom and movable with the said low tension electrode.

11. In a duplex igniter for internal combustion engines, the combination of a hollow bushing, a low tension electrode carried by said bushing, and a high tension electrode supported by said low tension electrode and movable thereby and insulated therefrom.

12. In an ignition device, the combination of a high tension electrode stem, and a movable low tension electrode, the high tension electrode being connected to the low tension electrode so as to be moved therewith when the low tension electrode is in action.

13. In an ignition device, the combination of a movable low tension electrode, and a high tension electrode insulated therefrom, the said high tension electrode being connected to the said low tension electrode to be moved therewith when the low tension electrode is in action.

14. In a duplex ignition device, the combination of a movable low tension electrode and a movable high tension electrode distinct from the movable low tension electrode and connected to move therewith.

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

CARL MESSERSCHMID.

Witnesses:
WILLIAM F. NICKEL,
PHILIP D. ROLLHAUS.