

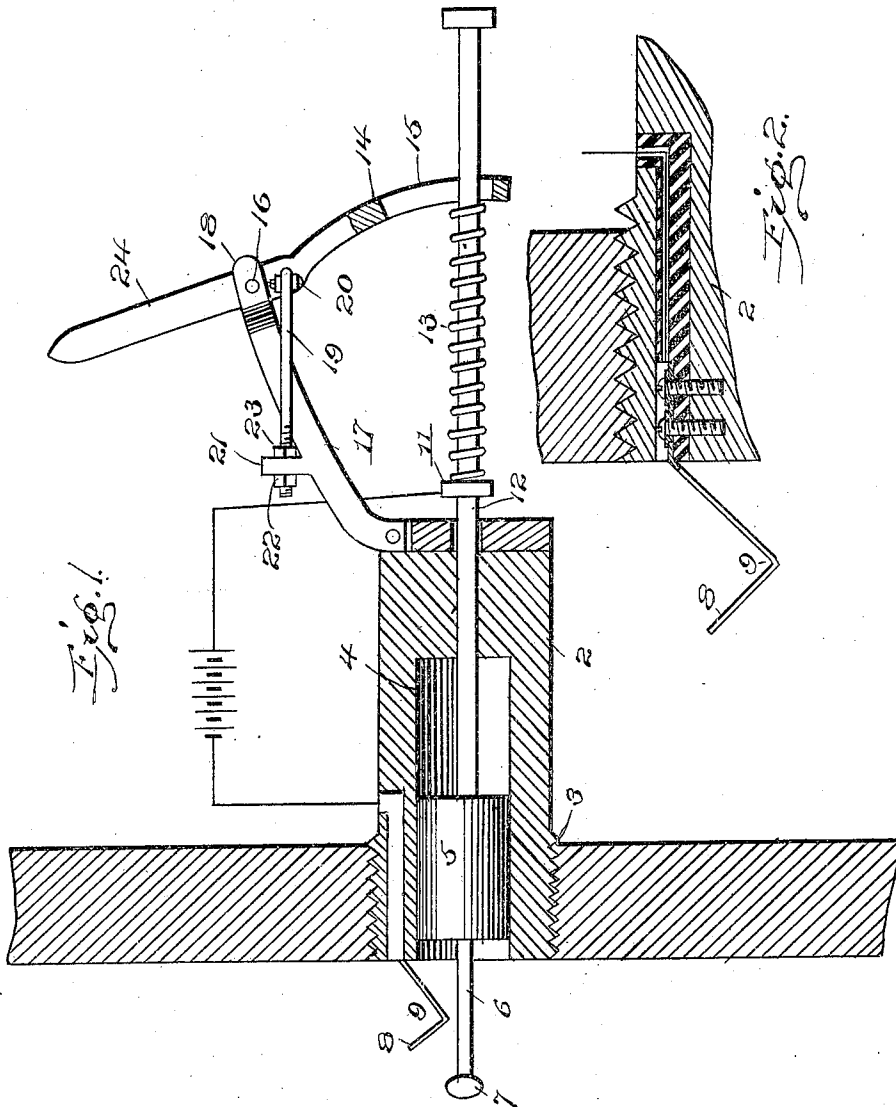
J. M. WOODS & J. S. MAIMONE.

SPARK PLUG.

APPLICATION FILED MAY 6, 1908.

961,056.

Patented June 7, 1910.



Witnesses  
*J. M. Fowler Jr.*  
*W. S. Kitchin.*

Inventors  
*Joseph M. Woods*  
*John S. Maimone*  
By *Mason Fenwick Lawrence*  
his Attorneys

# UNITED STATES PATENT OFFICE.

JOSEPH M. WOODS AND JOHN S. MAIMONE, OF DENVER, COLORADO, ASSIGNORS TO THE  
COMPRESSION SPARK PLUG COMPANY, OF DENVER, COLORADO, A CORPORATION  
OF COLORADO.

## SPARK-PLUG.

961,056.

Specification of Letters Patent.

Patented June 7, 1910.

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*To all whom it may concern:*

Be it known that we, JOSEPH M. WOODS and JOHN S. MAIMONE, citizens of the United States, residing at Denver, in the  
5 county of Denver and State of Colorado, have invented certain new and useful Improvements in Spark-Plugs; and we do hereby declare the following to be a full, clear,  
10 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.

This invention relates to improvements in sparking apparatus, and particularly to improved sparking apparatus for use in explosive engines, and has for an object the  
15 provision of an improved sparking device in which the contacts are brought together for forming a spark by the pressure of the explosive mixture in the cylinder of the  
20 engine previous to its explosion.

Another object of the invention is the provision of a sparking device arranged to spark when the explosive mixture in the cylinder, has attained a predetermined pressure,  
25 and means for regulating the sparking device for requiring various pressures in the engine cylinder for causing the sparking device to operate.

A further object of the invention is the provision of a sparking device arranged with a reciprocating plunger and movable  
30 contact in connection with the plunger adapted to be brought into contact with a stationary contact upon the compression of an explosive mixture in the cylinder to which the sparking attachment is secured,  
35 and means connected with the plunger for regulating the pressure necessary to move the same for permitting the movable contact point connected therewith to contact with the stationary contact.

With these and other objects in view the invention comprises certain novel constructions, combinations and arrangement  
45 of parts as will be hereinafter more fully described and claimed.

In the accompanying drawing, Figure 1 is a section through a sparking device and  
50 part of an explosive engine cylinder, the same embodying the features of the present invention. Fig. 2 is a detail fragmentary section showing the mounting of the stationary contact.

55 Referring to the drawing by numerals, 1

indicates a fragment of a cylinder of an explosive engine to which plug 2 is removably secured as by threads 3. Plug 2 is formed with a hollowed-out or cylindrical  
portion 4 in which reciprocates a plunger 60 or piston 5. The piston 5 carries at its inner end an extension or rod 6 that is rigidly secured to plunger 5 in any desired way as,  
for instance, by being threaded therein. Rod or extension 6 is provided at its outer end  
65 with a contact 7 formed of any desired material, but preferably of a material that will not deteriorate by continuous sparking and heat of the explosion chamber. The contact member 7 is adapted to contact with  
70 a spring contact member 8 that is secured at 9 to plug 2 by any desired means, as a screw. The spring contact member 8 is preferably formed substantially V shaped with the apex of the V in the path of movement of contact 7 so that whenever piston  
75 5 moves inward a sufficient distance contact 7 will engage contact 8, and when the same is connected properly to a source of current a spark will be the result. The spring contact  
80 8 is insulated by any desirable means, and is connected with one side of battery 10, the other side of battery 10 being connected with a stop 11 on piston rod 12.

Connected to plunger 9 is a piston rod 12 85 that extends through the outer end of plug 2 and extends any desired distance beyond the same. Rigidly secured to piston rod 12 is a stop 11 against which a spring 13 is adapted to press, the other end of the spring  
90 pressing against the end of movable lever 14. Spring 13 is coiled around piston 12 and may be of any desired strength, and is adapted to normally hold piston or plunger 5 in an inner position, or the position  
95 shown in the drawing. Lever 14 is formed with a slot 15 through which piston rod 12 is adapted to pass and by reason of the slot lever 14 may be moved upon its pivot 16. Pivot 16 passes through the bifurcated end  
100 of a brace 17 which is rigidly secured to plug 2. The pivotal member 16 is preferably a thumb screw and the bifurcated end 18 slightly yielding so that whenever the thumb screw 16 is screwed up tight the bifurcations will clamp lever 14, and prevent  
105 any pivotal movement thereof. To provide positive means for preventing any movement of lever 14 an auxiliary stay or lock is provided. This auxiliary stay or lock is  
110

formed from a pivotally mounted rod 19 pivotally mounted at 20 between a pair of upstanding ears on the lever 14. The free end of rod 19 passes through a bifurcated lug 21 formed on member 17, and has mounted thereon nuts 22 and 23. The nuts 22 and 23 are adapted to be moved to any desired position upon rod 19, and to then be clamped against extension 21. When lever 14 has been adjusted by means of rod 19, and respective nuts 22 and 23 have been tightened or clamped against extension 21 lever 14 will be positively locked or held in one position, and will remain in that position until the respective nuts 22 and 23 have been readjusted. A hand lever or grip 24 is provided for lever 14 for moving the same as may be desired when the various tightening or locking means have been loosened.

In operation when it is desired to start the engine lever 14 is adjusted until spring 13 is under such a tension as to require a certain known pressure in cylinder 1 to cause piston 5 to move outward and bring contacts 7 and 8 together. The engine is then turned over and as soon as the required pressure is attained piston 5 will move back and cause contacts 7 and 8 to touch, and when the same are brought into contact a spark will be produced for exploding the mixture in cylinder 1. This will impel the piston of the engine forward in the usual manner, and upon the return stroke or any of the succeeding strokes as the case may be a charge is drawn in and compressed. After the compression has reached a predetermined degree piston 5 will move back and cause contacts 7 and 8 to touch and produce a spark for exploding the compressed mixture. The engine continues to run with gas compressed to the degree required or found necessary to operate piston 5. If it is desired to cause the engine to work under a higher pressure lever 14 is moved for pressing the spring 13 to a greater extent so as to require a greater pressure for causing piston 5 to move outward and bring members 7 and 8 into contact. For instance, if the engine had been running under a compression of ten pounds and it is desired to raise the same to fifteen pounds lever 14 may be moved accordingly for requiring a fifteen pounds pressure in the cylinder 1 to force piston 5 outward. After this pressure has been attained in cylinder 1 contacts 7 and 8 will be brought together and form a spark which will explode the explosive mixture in the usual manner. The engine will then run at this high pressure in the usual manner; each new charge of explosive mixture being compressed to a pressure of fifteen pounds before the same is exploded. If it is desired to operate the engine under a still higher pressure for instance, 20 pounds, lever 14 is again moved for bringing spring

13 under such greater pressure, as will require 20 lbs. pressure in the cylinder to force piston 5 outward against the pressure of the spring as thus set. When lever 14 is set in this position the explosive mixture in cylinder 1 will only be ignited or exploded when the same has reached a twenty pound pressure or until the explosive mixture reaches such a pressure that points 7 and 8 will meet. By this construction and arrangement it will be observed that a spark may be provided in the cylinder 1 at any desired pressure of explosive mixture and that when a high speed is desired, the spark will be caused by only a small pressure and when a low speed is desired, the spark will be caused only by a high pressure, it being understood that low pressure in the cylinder is used for high speed and high pressure in the cylinder is used for low speed, so that any desired speed may be obtained by compressing spring 13 to a point where it will be operated by that pressure which will result from such length of stroke of the piston as will give the desired speed.

It is to be understood that the sparking apparatus forming the present invention may be used upon any desired kind of engine, either where the explosive mixture is forced into the engine under pressure or drawn in, in a well known manner, the construction and arrangement of the engine not being part of the present invention, but only the sparking apparatus in which the pressure of the explosive mixture previous to its explosion is adapted to cause the contacts to touch.

What we claim is:

1. In a sparking apparatus for an explosive engine, a plug, a reciprocating piston mounted therein and adapted to be moved in one direction by the pressure in the cylinder of said engine, a stationary contact, a movable contact secured to said piston and adapted to be brought in contact with said stationary contact when said piston is forced outward, a spring for normally forcing inward said piston, a lever for varying the tension of said spring, and means for locking said lever in various positions for holding said spring at various tensions.

2. In a sparking apparatus for explosive engines, a hollow plug, a pair of contact members, means for operating the contact members by means of explosive mixture in the cylinder; means for varying the operating pressure of said explosive mixture, and means for locking said means consisting of a lever and movable sliding rod working in an orifice and secured by a set screw.

3. In a sparking apparatus for explosive engines, a hollow plug, a stationary contact, a reciprocating contact, means positioned in said hollow plug and connected with said

reciprocating contact operable by the explosive mixture in the cylinder for causing said reciprocating contact to move against said stationary contact upon compression of the mixture, a spring acting against said reciprocating means, a pivotally mounted arm for varying the tension of said spring, a movable sliding arm connected to said pivotally mounted arm and means for locking said sliding arm against movement.

4. In a sparking apparatus for an explosive engine, a hollow plug, a reciprocating piston mounted therein and adapted to be moved in one direction by the pressure of the explosive mixture in the cylinder of said engine, a stationary contact point,

a movable contact secured to said piston, and adapted to be brought into contact with said stationary contact when said piston is forced outward, means for yieldingly forcing said piston inward, a lever for varying the tension of said yielding means, and an adjustable locking rod for locking said lever in various positions for holding said yielding means at various tensions.

In testimony whereof we affix our signatures in presence of two witnesses.

JOSEPH M. WOODS.  
JOHN S. MAIMONE.

Witnesses:

ISABEL M. STRONG,  
CARLE WHITEHEAD.