W. M. STEMPEL.

SPARKING DEVICE FOR ENGINES.

APPLICATION FILED MAY 16, 1912.

1,138,512.

Patented May 4, 1915.

2 SHEETS—SHEET 1.

Fig. 1.

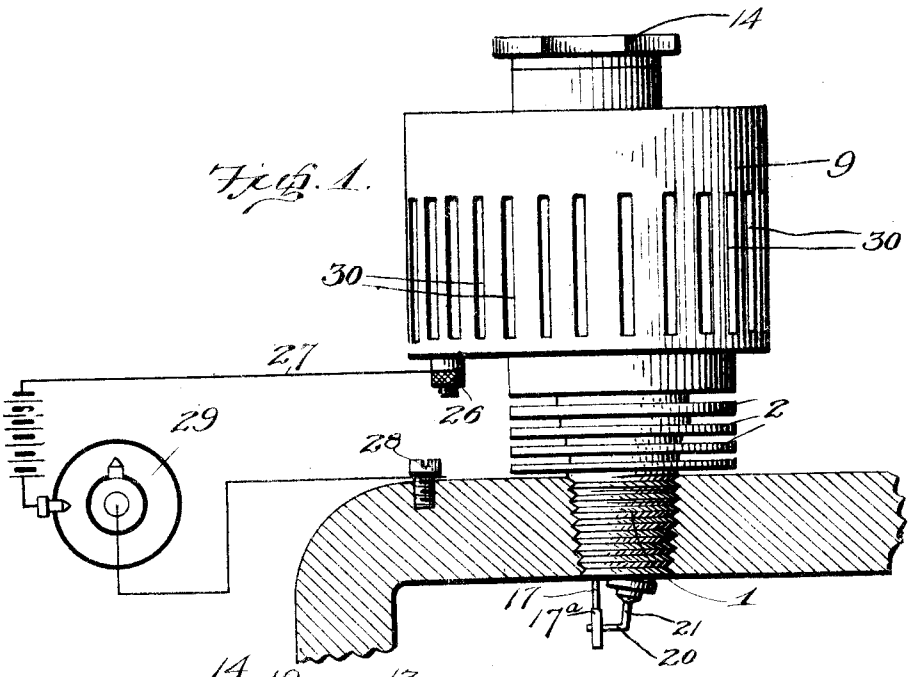

Fig. 2.

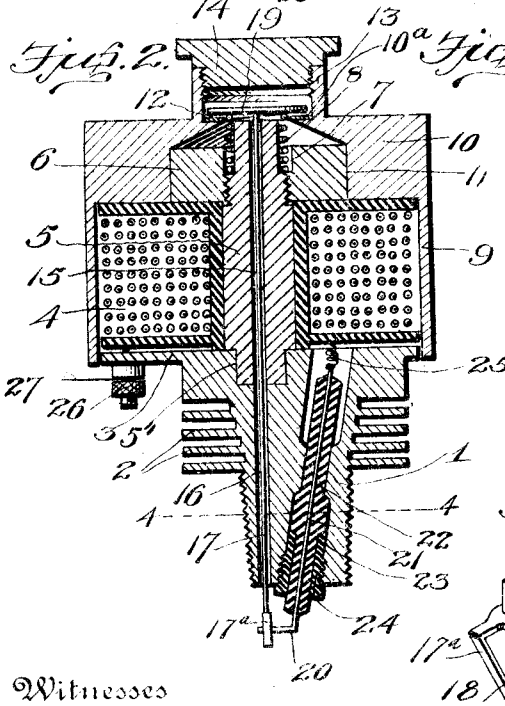

Fig. 3.

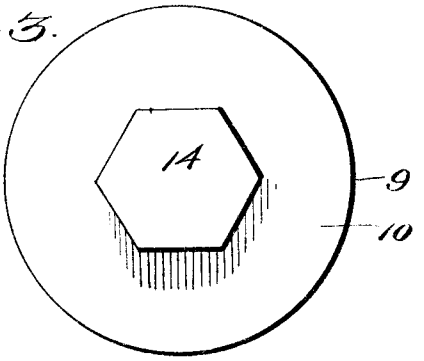

Fig. 4.

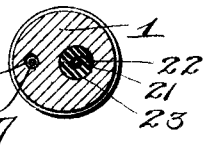

Fig. 10.

Witnesses

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2 SHEETS—SHEET 2

Fig. 5.

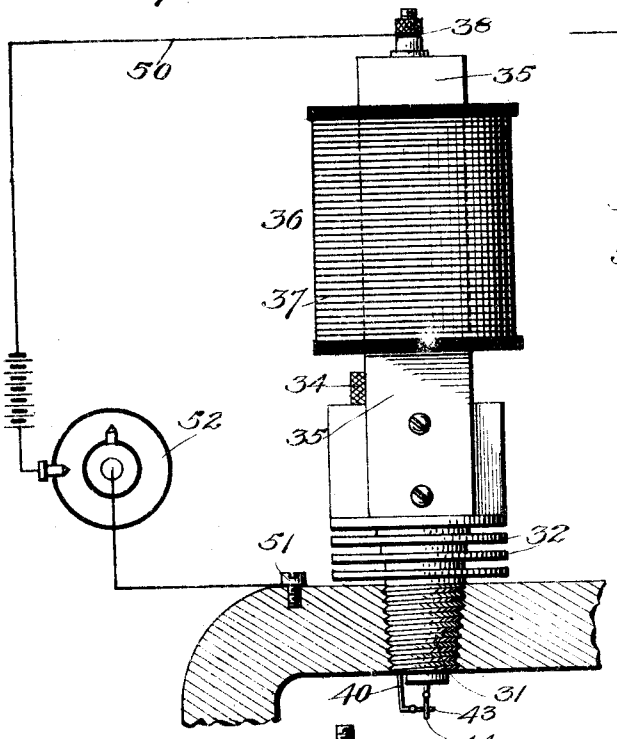
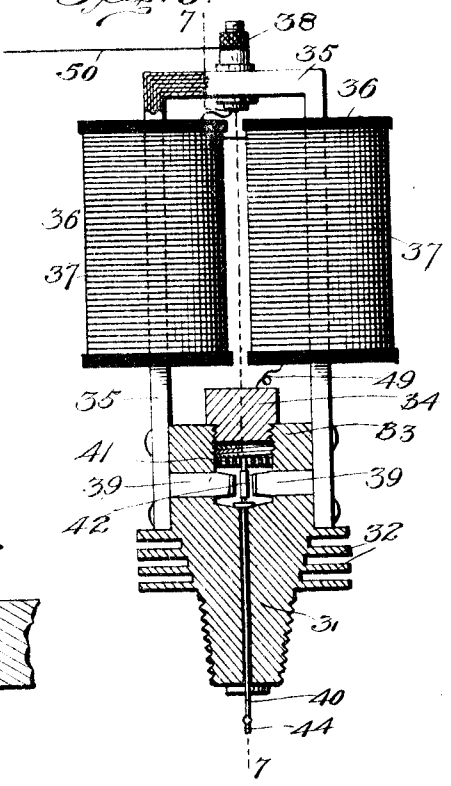


Fig. 6.



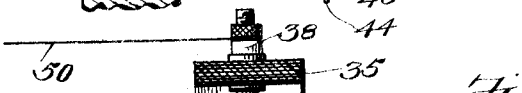


Fig. 7.

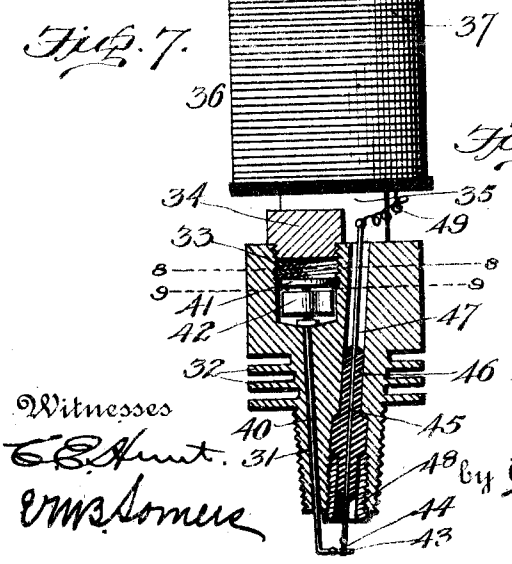


Fig. 8.

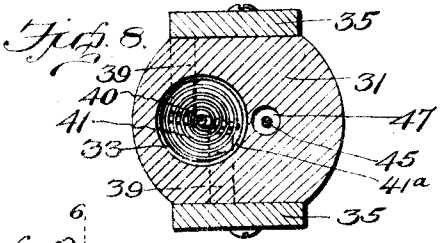
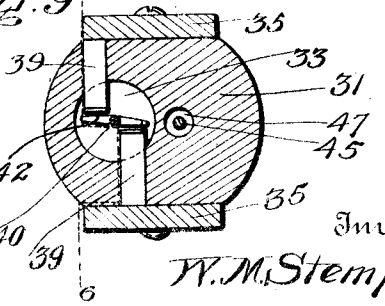


Fig. 9.



Witnesses

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UNITED STATES PATENT OFFICE.

WALDEMAR MATTHAEUS STEMPEL, OF FORT MADISON, IOWA.

SPARKING DEVICE FOR ENGINES.

1,138,512. Specification of Letters Patent. Patented May 4, 1915.

Application filed May 16, 1912. Serial No. 697,695.

To all whom it may concern:

Be it known that I, WALDEMAR M. STEMPEL, citizen of the United States, residing at Fort Madison, in the county of Lee and State of Iowa, have invented certain new and useful Improvements in Sparking Devices for Engines; and I do declare the following to be a full, clear, 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 devices for explosive engines.

One object of the invention is to provide a sparking device of this character having an improved construction and arrangement of circuit breaking mechanism whereby sparks will be repeatedly made as long as the circuit is closed by the timer of the engine.

Another object is to improve the construction and operation of the sparking device shown and described in United States Patent No. 943,324 granted to me December 14, 1909.

With these and other objects in view the invention consists of certain novel features of construction, and the combination and arrangement of parts as will be more fully described and claimed.

In the accompanying drawings; Figure 1 is a side view of my improved sparking device showing the same applied to an engine cylinder, the latter being shown in section; Fig. 2 is a central longitudinal sectional view through the sparking device; Fig. 3 is an outer end view thereof; Fig. 4 is a cross sectional view on the line 4—4 of Fig. 2; Fig. 5 is a view similar to Fig. 1 showing a modified form of the invention; Fig. 6 is a side view taken at right angles to Fig. 5 having the lower portion theroef in section the plane of said sectioned portion being shown by the dotted line 6—6 in Fig. 9; Fig. 7 is a vertical sectional view on the line 7—7 of Fig. 6; Fig. 8 is a horizontal sectional view on the line 8—8 of Fig. 7; Fig. 9 is a similar view on the line 9—9 of Fig. 7; Fig. 10 is a detail perspective view of the inner end of one of the contact bars of the first form of sparking device showing more clearly the construction thereof and the arrangement of the contact point therein.

Referring more particularly to the first four figures of the drawing, 1 denotes the supporting plug of a sparking mechanism, said plug being adapted to be screwed into the cylinder of the engine in the usual manner. The plug has formed thereon a series of annular heat radiating flanges 2 whereby the heat of the plug from the engine is reduced. On the upper end of the plug is formed an annular eccentrically arranged plate 3 which together with the upper end of the plug forms the base of an electro-magnet 4. The magnet 4 comprises a coil arranged on a soft iron core 5 having a reduced lower end which is fitted and secured in a recess 5′ in the upper end of the plug as shown. The outer end of the core 5 is extended a considerable distance beyond the outer end of the coil and for a portion of its length said extended end of the core is threaded and has screwed thereon a brass coil retaining block 6 rigidly secured to and forming part of a shell or casing hereinafter described. The outer portion of the extended end of the core is reduced and the outer portion of the bore of the nut 6 around said reduced extension of the core is enlarged to form a socket 7 with which is engaged the inner end of a coiled spring 8 the purpose of which will be hereinafter described. The outer end of the core when thus constructed and arranged forms one pole of the magnet which is bi-polar and has its opposite pole constructed in the form of a shell or casing 9 which is engaged with the magnet core and plate 3 of the plug as shown. The outer end of the shell or casing 9 is closed by a thick wall or head 10 and in said wall or head is formed a centrally disposed recess 11 in which the nut 6 on the core of the magnet is arranged. The outer end of the recess 11 tapers toward a central aperture 12 in the outer end of the head 10 and in said aperture is disposed the reduced outer end of the core 5, said end being flush with the outer surface of the head of the casing around the aperture 12 as shown. The outer end of the core 5 and the adjacent surface of the outer end of the head 10 of the shell or casing forms the two poles of the magnet. On the surface of the head 10 of the shell or casing forming one pole of the magnet and surrounding the outer end of the core 5 is arranged a copper ring or washer 10^a which will effectually prevent the armature, hereinafter described, from coming into actual contact with the pole of the magnet as this engagement will cause the armature to

stick for an appreciable time after the current is turned off which would seriously interfere with the working of the present device. On the outer end of the head around the aperture 12 therein and spaced a suitable distance therefrom is formed an annular outwardly projecting flange 13 which is threaded internally and is adapted to receive a non-magnetic screw plug or cap 14 which, when screwed into said flange forms a closed compartment the purpose of which will be hereinafter described.

Formed in the core 5 is a central longitudinally disposed passage 15 which communicates at its inner end with a similar passage 16 formed in the plug 1 and slidably mounted in said passages 15 and 16 is a contact bar 17. The inner end of the bar 17 has formed thereon a triangularly shaped frame 17ª in the lower end or apex of which is arranged a tip or contact point 18 which is preferably formed of platinum. This construction and arrangement of contact point is provided to prevent the same from being broken down or affected by the heat of the engine. The outer end of the contact bar 17 projects through and beyond the outer end of the core 5 and into the compartment formed by the flange 13 and has secured thereto a circular plate 19 which forms the armature of the magnet. The plate 19 is adapted to be engaged by the spring 8 and the pressure of the spring is thus applied to retract the contact bar 17 and to bring the platinum contact point 18 on the outer end thereof into engagement with a contact point 20 formed on the outer end of a contact bar 21 which is secured in and insulated from the plug by a sleeve 22 formed of suitable non-conducting material and arranged in an obliquely disposed passage 23 formed in the plug as shown. The contact bar 21 and the insulating sleeve 22 are removably held in position in the passage 23 by a tubular threaded plug 24 screwed into the threaded outer end of the passage 23 as shown. The inner end of the stationary contact bar 21 is connected by a short contact wire 25 to one end of the magnet coil 4, the opposite end of which is connected with a binding post 26 to which is also connected one terminal of an electric circuit 27 the opposite terminal of which is connected with a binding screw 28 in the cylinder of the engine as clearly shown in Fig. 1 of the drawing. In the circuit 27 is also arranged a timer 29 whereby the current passing through the circuit 27 is controlled. The side of the shell or casing is preferably provided with a plurality of longitudinally disposed slots 30 which afford ventilation for the coil and also serve as far as possible to laminate the magnetic circuit. By thus arranging the magnet 4 and the armature 19 it will be seen that as soon as the magnet is energized by the completion of the electric circuit 27 through the timer 29 that the poles of the magnet will attract the armature thus projecting the contact rod against the pressure of the spring 8 and also breaking the electric connection between the contact points 18 and 20 which will cause a spark and will simultaneously break the electric circuit through the magnet whereupon the spring 8 will immediately again retract the contact bar 17 and armature 19 thus bringing the contact points 18 and 20 into electrical engagement whereupon the electric circuit will again be completed and the magnet energized and caused to attract the armature and project the contact bar which will again separate the contact plated 18 and 20 causing a second spark. This operation will be repeated as long as the circuit is closed by the timer 29.

The form of the invention shown in the last five figures of the drawing comprises a plug 31 constructed in a similar manner to the plug 1 in the first form of the invention, said plug 31 being provided with annular heat radiating flanges 32. The plug 31 is preferably constructed of brass and has formed in its outer end an eccentrically disposed socket or recess 33, said recess being internally threaded at its outer end to receive a screw plug 34 whereby the socket is closed. The upper end of the plug 31 is flattened on two of its diametrically opposite sides and to said flattened sides is secured the lower ends of the core 35 of an electro-magnet 36 the coils 37 of which are secured to the outer portion of the core as shown. The core 35 is preferably laminated and has arranged in its outer end a binding post 38. The inner ends of the core 35 are in electrical engagement with the outer ends of two soft iron contact pieces 39 which are secured in suitable passages provided therefor in the upper portion of the plug 31. The pieces 39 are offset or out of vertical alinement with each other as clearly shown in Figs. 8 and 9 of the drawing and have their inner ends projecting into the socket 33 of the plug for a purpose hereinafter described.

Revolubly mounted in the plug 31 is a contact bar 40 the upper end of which projects into the socket 33 in the upper portion of the plug and is secured to the inner end of a non-magnetic coiled operating spring 41 the pressure of which is exerted to turn or revolve the bar 40 in one direction. On the upper end of the bar 40 below the spring is arranged a plate 42 the ends of which project laterally and are disposed opposite to the inner ends of the soft iron plates 39. The plate 42 when thus arranged forms an armature which is adapted to be attracted by the bars 39 when the latter are magnetized by the current passing through the

electro-magnet, with the poles of which the plates 39 are in magnetical connection as hereinbefore described. The plates 39 are arranged to attract the armature plate 42 and turn the contact bar 40 against the pressure of and in the opposite direction from which the same is turned by the coiled spring 41, the outer end of which is secured to a ring 41ª which in turn is secured to the walls of the socket 33 as shown.

The outer end of the contact bar 40 has formed thereon a right angularly projecting contact tip or terminal 43, which when the bar 40 is actuated by the spring 41 is adapted to be brought into engagement with the tip or terminal 44 of a stationary contact bar 45 which is secured to and insulated from the plug by a sleeve 46 of non-conducting material, said sleeve being disposed in a passage 47 formed in the plug as shown. The sleeve is held in position in the passage 47 by a plug 48 screwed into the outer end of the passage. The inner end of the contact bar 48 is connected by a short conducting wire 49 with one end of the coils 37 of the magnet 36 the opposite end of which is connected with the binding post 38 as shown. With the binding post 38 is also connected one terminal of an electric circuit 50 the opposite terminal of which is connected by a binding screw 51 with the engine cylinder as shown. In the circuit 50 is also arranged a timer 52 which closes the circuit through the magnet coils thereby energizing the magnet and the contact pieces 39 thus causing the latter to attract the armature 42 and to thereby revolve the contact bar 40 against the pressure of the spring 41. In thus revolving the bar 40 the contact between the terminals or points 43 and 44 of the contact bars 40 and 46 is broken thus breaking the circuit through the magnet whereupon the plates 39 will be demagnetized and the armature thus released at which time the pressure of the spring 41 will revolve the contact bar in the opposite direction and bring the terminals 43 and 44 into electric contact, thus completing the circuit through the magnet and causing the plates 39 to again attract the armature and break the connection of the terminals 43 and 44 of the electric circuit 50. This making and breaking of the circuit is repeated as long as the circuit is completed by the timer 52.

From the foregoing description taken in connection with the accompanying drawings, the construction and operation of the invention will be readily understood without requiring a more extended explanation.

Various changes in the form, proportion and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of the invention as claimed.

Having thus described my invention, what I claim is:

1. A sparking device of the character described comprising a plug, an electro-magnet arranged on said plug, said magnet having a core adapted to form one pole thereof, a casing arranged around said magnet and adapted to form the opposite pole, said casing having in its side walls a plurality of slots and having a closed outer end provided with a recess and a central passage, an armature compartment formed on the outer end of the casing and communicating through the passage with the recess in said end, a plug to close the outer end of said compartment, a stationary contact bar arranged in and insulated from said plug, said bar having an electrical connection with the magnet, a movable contact bar slidably mounted in the plug and extending through the core of the magnet and into said armature compartment, an armature arranged on the end of the bar in said compartment, and means whereby said movable contact bar is reciprocated to bring the same into and out of electrical engagement with said stationary contact bar thereby making and breaking the electric circuit through the magnet and producing sparks.

2. A sparking device of the character described comprising a plug, an electro-magnet arranged on said plug, said magnet having a core adapted to form one pole thereof, a casing arranged around said magnet and adapted to form the opposite pole, an armature compartment formed on the outer end of the casing and communicating through the passage with the recess in said end, a plug to close the outer end of said compartment, a stationary contact bar arranged in and insulated from said plug, said bar having an electrical connection with the magnet, a movable contact bar slidably mounted in the plug and extending through the core of the magnet and into said armature compartment, an armature arranged on the end of the bar in said compartment, and means whereby said movable contact bar is reciprocated to bring the same into and out of electrical engagement with said stationary contact bar thereby making and breaking the electric circuit through the magnet and producing sparks.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

WALDEMAR MATTHAEUS STEMPEL.

Witnesses:

GEORGE WEDINGTON,

HARVEY D. WAGONER.