

J. F. LEDANOIS.
SPARKING PLUG FOR EXPLOSION MOTORS IN GENERAL.
APPLICATION FILED MAY 3, 1918.

1,307,910.

Patented June 24, 1919.
4 SHEETS—SHEET 1.

Fig. 1.

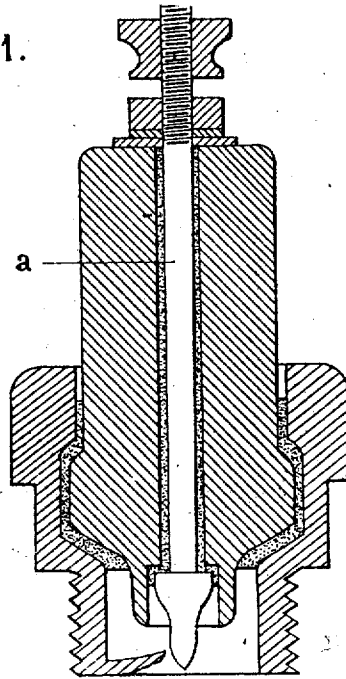
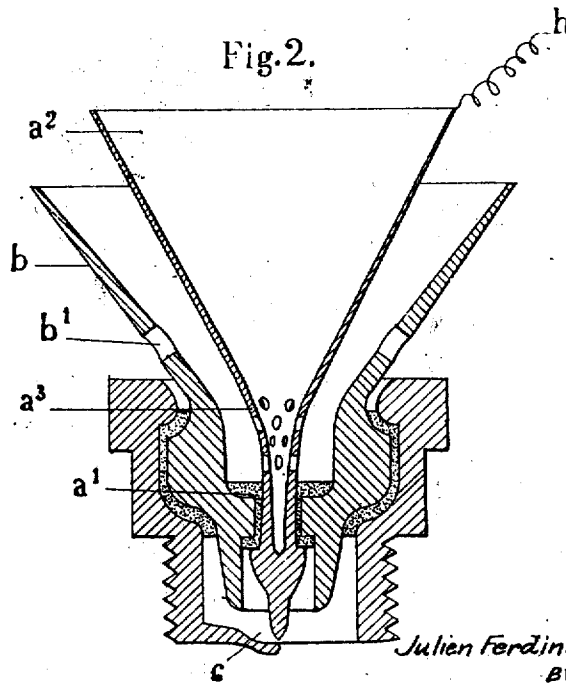


Fig. 2.



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Fig. 3.

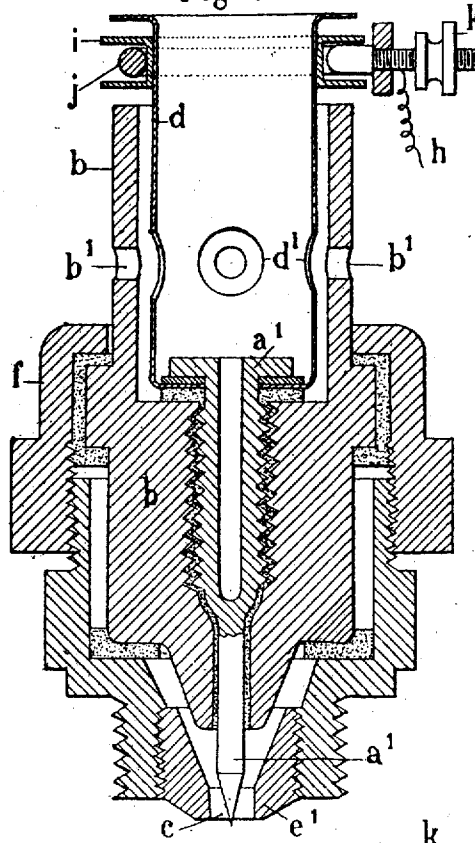
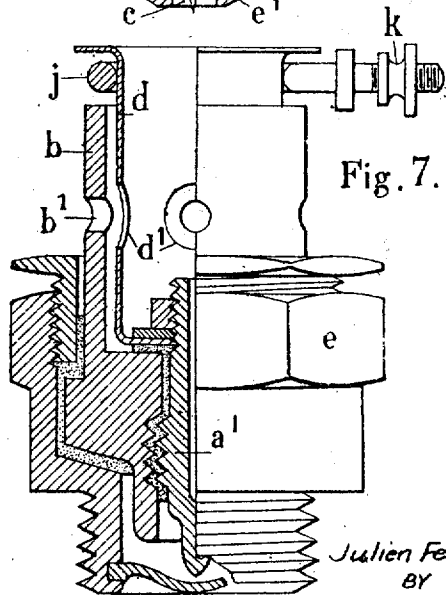


Fig. 7.



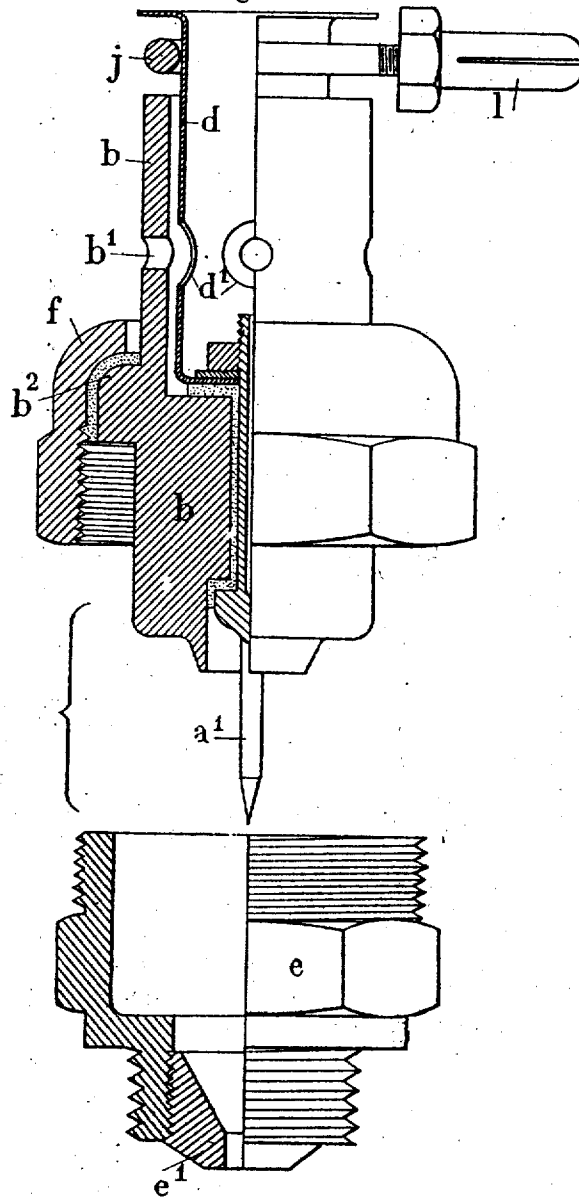
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Fig. 4.



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4 SHEETS—SHEET 4.

Fig. 5.

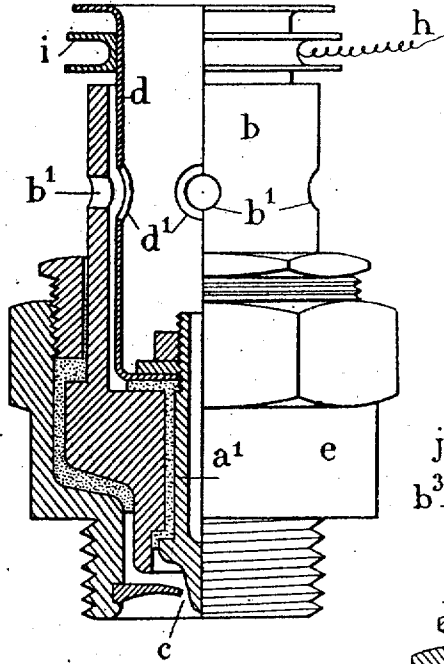


Fig. 6

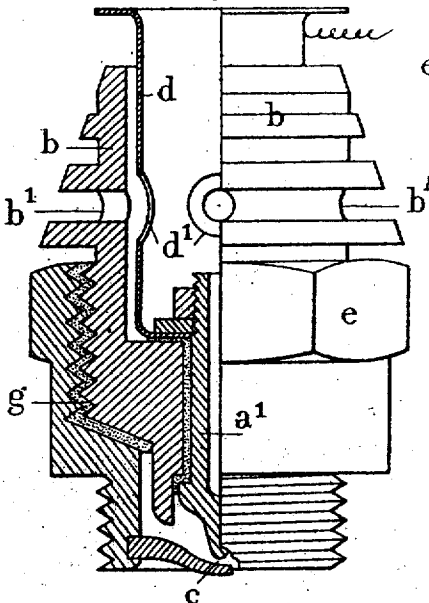
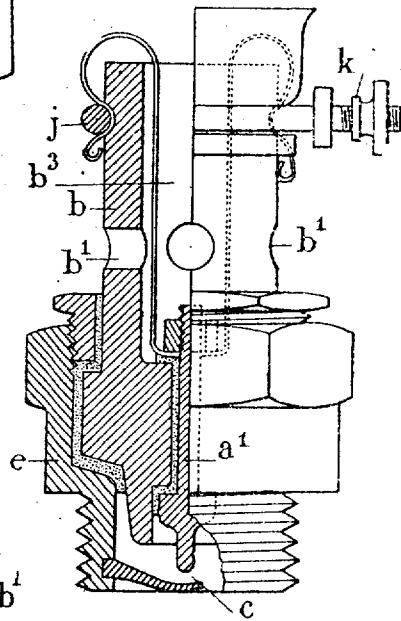


Fig. 7



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UNITED STATES PATENT OFFICE.

JULIEN FERDINAND LEDANOIS, OF BILLANCOURT, FRANCE.

SPARKING PLUG FOR EXPLOSION-MOTORS IN GENERAL.

1,307,910.

Specification of Letters Patent. Patented June 24, 1919.

Application filed May 3, 1918. Serial No. 232,356.

To all whom it may concern:

Be it known that I, JULIEN FERDINAND LEDANOIS, of 157^{bis} Route de Versailles, Billancourt, (Seine,) France, have invented Sparking Plugs for Explosion-Motors in General, of which the following is a full, clear, and exact description.

It is well known that for the ignition of explosion motors of high thermal efficiency, it is necessary, in order to avoid the phenomena of self-ignition, to use sparking plugs having a very high cooling power.

Actually, the central electrodes of the sparking plugs are constituted by a metal rod of small diameter simply surrounded by an insulation of porcelain, mica or the like.

This covering, while constituting a proper electric insulation for the said electrode, is at the same time a bad conductor of heat, thus causing a rapid heating of the plugs. In fact, under these conditions, the central electrode stores the heat produced by the motor at the time of the explosions and this often in such a manner that it is very quickly brought to a temperature sufficiently high to cause the objectionable phenomena of self-ignition which determine a bad working of the motor.

This invention relates to a sparking plug in which the central electrode is cooled by a large cooling surface constituted by using the least possible quantity of material.

The object of this invention is to obtain this cooling for the parts capable of storing a large excess of heat, such as the central electrode and its insulation. This system of plug, applicable to all types of explosion motors, offers for those which are of the rotary type, in addition to a very high cooling power, the advantage of being, by its light weight, but slightly sensible to the action of centrifugal force.

This improved plug comprises moreover a cap in which the inner part consists of a removable cup preventing oil or calamin from entering the said cap during the time of explosion, while still producing if necessary the automatic cleaning of said inner part during the suction stroke.

Moreover, the removability of said cup allows, with the non detachable plug, of the corresponding parts to be cleaned by hand.

Finally, the improved plug is so designed that it can be readily taken to pieces when necessary.

This invention will be described hereafter by way of example with reference to the accompanying drawings in which:

Figure 1 is a diagrammatic view showing a sparking plug of one of the current types.

Fig. 2 is a diagrammatic view of a plug made according to this invention and with the same quantity of material as that shown in Fig. 1.

Fig. 3 shows in vertical section one way of putting the invention into practice.

Fig. 4 shows separately the upper and lower parts of this sparking plug.

Fig. 5 illustrates half in elevation and half in vertical section a modification of said plug.

Fig. 6 is a similar view to Fig. 5 illustrating another modification.

Fig. 7 is a similar view to Figs. 5 and 6 showing a further modification.

Fig. 8 is a similar view to the above figures showing another modification of the said plug.

As seen in the drawings, the improved plug, instead of comprising simply a central electrode consisting of a simple solid rod or stem *a*, as in Fig. 1, is provided with a rod *a'* formed with a relatively very large flared part constituting a kind of very thin cup *a''* of decreasing thickness as shown diagrammatically in Fig. 2. The casing *b*, made of insulating material, takes the shape of this electrode and thus has a very large surface, whereby a very satisfactory cooling effect is obtained.

Side openings *a''* formed in the electrode *a'* as near as possible to the ignition point *c* further increase the cooling effect.

Side openings *b'* are formed in the casing *b*.

By these means, the central electrode *a'* is in efficient contact with the atmosphere not only by the hollow part of the rod but also by the large surface casing *b* in which the air circulates.

In rotary engines, the cooling effect is further increased by the sudden admission of the air in the casing *b* forming a funnel and its rapid exit through the side openings *b'* in said casing.

Finally, the plug being opened at its upper end, the air is in permanent contact with the electrode *a'* and with the casing *b* both internally and externally.

In the various methods of construction of

this sparking plug, illustrated in Figs. 3 to 7 of the drawings, the central electrode consists of a rod a^1 hollow at its upper part and solid at the end adjacent to the ignition point c ; moreover, a very thin metal cup d , of the largest possible diameter, is secured to the upper part of this rod and forms an extension thereof. This cup is perforated with suitable side openings d^1 .

10 The central electrode a^1 is surrounded by a casing b , made of suitable material and perforated with side openings b^1 .

In order to be able to take this plug to pieces, as illustrated in Figs. 3 and 4, the cap e is connected to the body of the plug by a nipple f which grips the insulation b at the point b^2 .

By unscrewing the nipple f , the insulation b may be easily cleaned and the impurities which may have entered the cap e and cause short circuits and misfires can be readily removed from the interior of said cap e .

Moreover, the internal arrangement of the cap, at the ignition point c is in the shape of a cup e^1 smooth or grooved longitudinally.

This arrangement is doubly useful:

1°.—At the time of the explosion, the oil or the calamin thrown off will enter with difficulty through a narrow opening in a chamber where the gases being compressed, form a kind of cushion and moreover, the insulation is by this fact, protected against the flashes of the explosion;

2°.—During the suction stroke, the partial vacuum produced in the cylinder will entail the exit of the oil and calamin which may still have entered the cup; this exit will be the more rapid the more the cone will take exactly the shape of the electrode and the force of suction produced by the suction stroke will vary according to the angle of the cone, the cross-section and the shape of the exit orifice which increases the speed of the air by its narrowness.

45 The dismounting of this part of the cap is very important for the non detachable sparking plugs, those which are beaded for instance, as it enables the interior of the cup and the accessible part of the insulation as well as the electrode to be cleaned.

The cooling of the casing b made of insulating material may be sensibly increased by providing it with wings or ribs, as illustrated in Fig. 6 and by securing this casing in the cap e of the sparking plug by means of a special screw threaded sheath g ; in this way the casing b is in more intimate contact with the metal part e and benefits, by this fact, of the cooling of the latter by the air of the atmosphere.

60 The rod of the electrode a^1 may be screw threaded, as shown in Figs. 3 and 4, or may

be smooth, as illustrated in Fig. 5, or screw-threaded and smooth as in Fig. 7, etc.

Finally, the rod proper a^1 of the electrode might be solid, as in Fig. 8. The recess b^2 formed in the casing b plays the part of a cup.

The securing of the wire h leading in the current may be made either directly on the cup d , as in Fig. 7, or in a movable groove i , as in Fig. 5, or still by a clamping ring j provided with a nut k , as in Figs. 3, 7 and 8, or with a peg l , as in Fig. 4.

The forms, details, accessories, materials and dimensions of this type of sparking plug may of course be varied without modifying the scope of this invention.

Claims:

1. A sparking plug for explosion motor in general, characterized by a wide, thin and perforated cooling cup arranged at the upper part of the central electrode and by a wide and perforated cooling casing made of insulating material surrounding the said electrode, this sparking plug comprising also a removable cap and means allowing to separate readily the body of the plug from the cap.

2. A sparking plug comprising in combination a central electrode, a cooling cup constituting a part thereof, a cooling casing surrounding said cup, a cap surrounding the lower end of the electrode, and a removable cup shaped member arranged in said cap and surrounding the lower end of the electrode.

3. A sparking plug comprising in combination a central electrode, a cooling cup projecting outwardly therefrom, a cooling casing surrounding said cup, a cap surrounding the lower end of the electrode, a cup shaped member removably held within said cap, and means for separably connecting the body of the spark plug with the cap.

4. A sparking plug comprising in combination a central electrode, a perforated cooling cup projecting outwardly therefrom, and a perforated cooling casing surrounding said cooling cup.

5. A sparking plug for explosion motors in general characterized by an expanded laterally perforated cooling cup extending outwardly from the outer part of the central electrode and by an expanded and laterally perforated casing of insulating material surrounding the said electrode and spaced therefrom.

The foregoing specification of my "sparking plugs for explosion motors in general," signed by me March 1918.

JULIEN FERDINAND LEDANOIS.

Witnesses:

CHAS. P. PRESSLY,
FRANÇOIS WEBER.