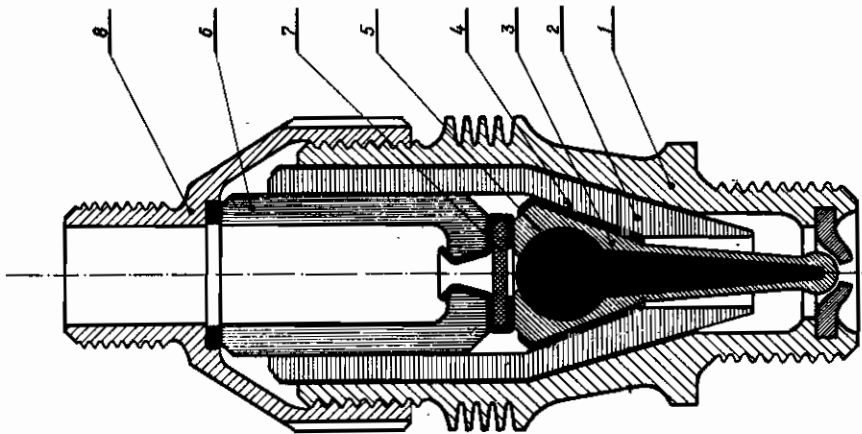
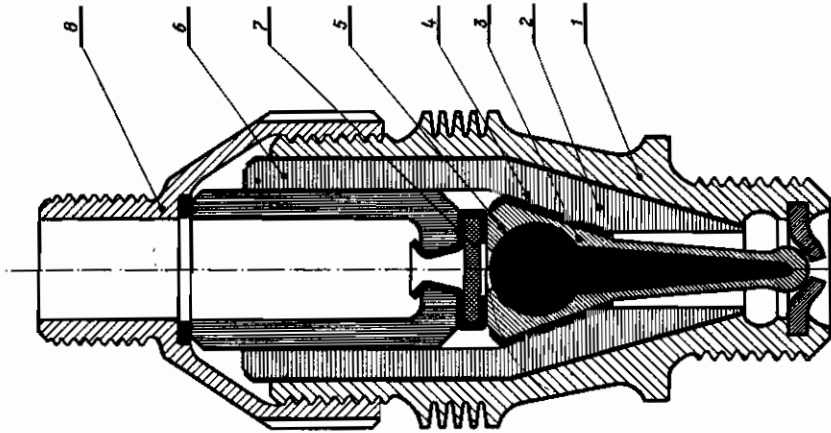


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AERO-ENGINE SPARKING PLUG WITH  
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# ALIEN PROPERTY CUSTODIAN

## AERO-ENGINE SPARKING PLUG WITH A SOLID INSULATOR

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Application filed June 25, 1940

This patent deals with improvements applied to the unscreened and screened aero-engine sparking plug.

By these improvements incorporated, small variations of the central electrode temperature are obtained within relatively wide limits of the thermic loads of the engine increasing at the same time considerably reliability from the electrical, thermic, and mechanical point of view.

Consequently, this new design of the sparking plug diminishes the possibility of fouling and overheating, giving at the same time a sparking plug more universal and more reliable in service and with a lower production cost.

In the existing aviation plugs, it is the central electrode in which the main electrical insulator is fixedly incorporated, and thus insulated electrode is fitted into the body of the sparking plug in a detachable way. This type of design requires a relatively long central electrode, conditioned further with the necessary length of the insulation both of the in- and outside of the plug in order to make impossible the electrical losses. On the other hand, this conception allows only a relatively small diameter of the central electrode which is also limited by the standard thread for fitting the plug into the cylinder. Finally such a design does not allow a shape of the central electrode with a favourable thermal gradient.

In fact, in the known types of the plugs, a certain increase in the thermal capacity as well as acceleration of the heat-exchange was obtained by incorporating a highly conductive metal, such as copper, around and in the hollow of a long and thin electrode. The effect of such an arrangement was forcibly small not only owing to this insufficient capacitive mass but also owing to the absence of alignment of same in the proximity of the spot where the exchange of the heat takes place.

With this new design a compact main insulator is incorporated in the body of the sparking plug. The hollow in this insulating bush provides in its centre a tapered seat for the central electrode. The electrode itself is relatively short and has a voluminous and tapered head by which the electrode is fitted in a detachable way over a copper joint into the tapered seat of the insulator. The electrode is secured in the seat by a special nut screwed on the upper part of the plug body by means of an intermediate insulating distance piece into which the electric cable is inserted. At the same time to the free part of the central electrode a conven-

ient shape, from the point of view of the heat exchange, can be given.

Further by this new conception, the central electrode by its design offers a possibility not only to incorporate conveniently a metal of a great conductivity, as copper, into the electrode in order to improve the heat conductivity, but also to concentrate this mass in the head, viz. near the end in order to obtain caloric capacity. By this arrangement a thermic accumulator with efficient heat exchange is created, thus damping temperature variations of the electrode end.

With regard to reliability and endurance this new design offers following advantages:

With the existing plugs the conditions of gas-tightness and reliability are bad due to great difference in dilatation between the central electrode and electric insulator incorporated into said electrode.

With the new design this disadvantage is eliminated, because the dilatation of the central electrode has practically no effect whatsoever on the insulator.

In the existing plugs the internal insulation towards the combustion chamber is highly loaded particularly from the thermal viewpoint, because the insulation is fitted on the central electrode, and in the new plug this insulation is situated more favourably being fitted in the body of plug itself which has a relatively low temperature.

With regard to the insulation, the present design allows the use of a solid insulator such as oxide of aluminium or steatit.

The reasons, such as cracking of the insulator, bad gas-tightness, etc., for which these insulators could not be used with the existing types of plugs for the engines of a high output, are eliminated in the new design.

In short, the present solution of the sparking plug, with all its outlined qualities and especially the possibility of better cooling and better conditions of the heat exchange of the central electrode gives in comparison to the existing plugs considerable advantages, especially for highly rated aero-engines.

The diagram showing a longitudinal section is attached in order to give the idea of the two alternative realisations of the design of the new plug.

In the body of the plug (1), the solid insulator (2) is incorporated. The tapered head of the central electrode (3) is fitted over a copper joint (4) into the tapered seat of the insulator.

In the electrode itself is placed a conductive and capacitive mass (5), viz. copper. This electrode is secured in its seat by the insulating distance piece (6), washer (7) and the securing nut (8). The electric cable, the wires of which are in electric contact with the washer (7), is inserted inside the distance piece. The metal elbow of the screen is fixed to the threaded end of the securing nut.

*Summary of the covering patent*

This aero-engine sparking plug is character-

ized by a solid insulator fitted into the body of the plug bearing the central electrode with its voluminous and tapered head in a detachable way. This electrode secured on the tapered seat of the insulator by a securing nut and insulating distance piece, is filled with a highly thermally conductive metal which serves as an accumulator heat damper not only in its free end but as well in its head.

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