March 8, 1949. P. S. VAN ORDEN 2,463,924

SPARK PLUG SHIELD

Filed May 9, 1946

Fig. 1.

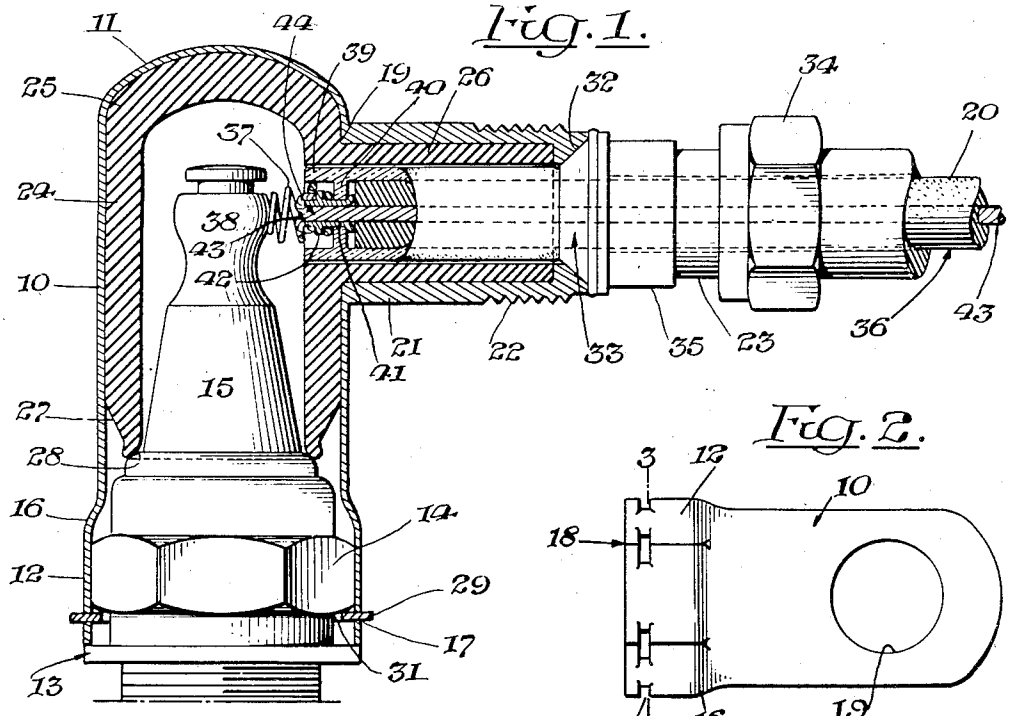


Fig. 2.

Fig. 4.

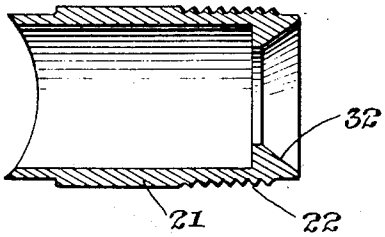


Fig. 3.

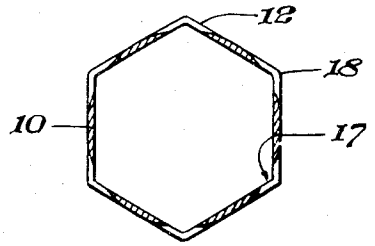


Fig. 5.

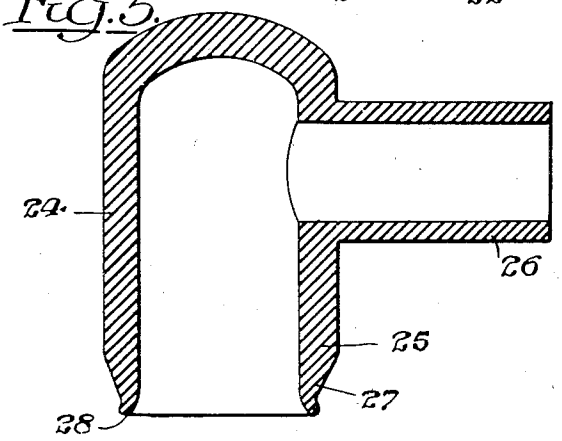
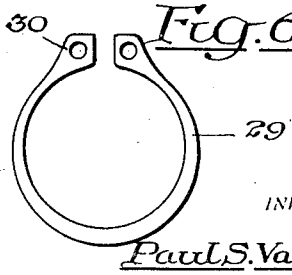


Fig. 6.



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SPARK PLUG SHIELD

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4 Claims. (Cl. 174—35)

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This invention relates to spark plug shields such as are used to prevent the radiation of electrical waves from ignition systems. Such radiations interfere with radio communication with aeroplanes, ships, or vehicles using internal combustion engines.

An object of this invention is to supply an effective shield which may be readily used in conjunction with a typical aviation type spark plug.

Another object of this invention is to construct a spark plug shield which is adapted for use where the spark plug is located in a deep recess or well in the cylinder head.

A feature of this shield is that it may be easily and quickly applied or removed.

Another feature of this shield is that it may be inserted upon or taken off the spark plug without removing the said plug.

An object of this shield is to form a closed chamber around the stem of the spark plug to prevent water, oil, or other foreign substances from entering therein.

Another object of this invention is to furnish a shield which will withstand shocks and vibrations, having an internal insulator which may be easily replaced in the field.

The invention consists of the construction, combination and arrangement of parts, as hereinafter illustrated, described and claimed.

In the accompanying drawings, forming part hereof, is illustrated one form of embodiment of the invention, in which drawings similar reference characters designate corresponding parts, and in which:

Figure 1 is a vertical section of a complete embodiment of the spark plug shield with the contact portion cut away.

Figure 2 is a side elevation of the body portion of the shield shell.

Figure 3 is a horizontal section, taken on line 3—3 of Figure 2.

Figure 4 is a vertical section of the outlet housing of the shield.

Figure 5 is a vertical section of the dielectric shield liner.

Figure 6 is a side elevation of the ring retainer of the spark plug shield.

Referring to the drawings, and particularly to Figure 1, 10 indicates a cylindrical metal shell body. The upper end of the shell 10 is sealed by a dome shaped structure 11 integral therewith. The lower portion of the shell 10 is open and expanded into a hollow hexagonal shape 12. The inside dimensions of the expanded portion of the

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shell 12 permits it to slide snugly over the hexagonal member 14 of a typical aviation spark plug 15. The bottom of the shield 10 rests upon the circular flange 13 of the spark plug 15 and grounds the shield to the plug at that point.

A series of horizontal slots 17, shown in Figure 2, is cut into the hexagon-shaped base. Each slot 17 is sufficiently deep to cut through the corners 18 of the hexagonal shape 12 for a hereinafter described purpose. The shell 10 is provided with a hole 19 adapted to receive an ignition lead cable 20 which is connected to the spark plug 15.

The ignition cable 20 is passed through an outlet 21 before it enters the shell 10. The outlet 21 is attached, as by soldering, to the shell 10 and shields the openings 19 therein. The outlet 21 is tubular in shape and is provided with an external thread 22 at the end thereof for attachment of a shielded conduit 23.

A flexible insulating lining 24 hereinafter referred to as rubber, but not limited to that material, is inserted within the shield. The insulator 24, as shown in Figure 5, comprises a hollow main body portion 25, which conforms to the shape of the shield shell 10, and an extending sleeve 26 integral therewith which projects into the bore of the outlet 21. The lower portion of the main body 25 of the insulator terminates in a thinned rim 27 having an inner chamfer 28. This construction of the insulator 24 serves a twofold purpose. When the shield is applied to the spark plug 15 the thinned rim 27 bears firmly against the metal of the plug 15 to seal the chamber within the shield. In addition, the insulator 24 is compressed between the shield 10 and the spark plug 15, cushioning the shield against any vibrations or shocks which might be transmitted to it from the engine.

A snap ring 29, shown in Figure 6, completes the construction of the spark plug shield. The ring 29 is sprung apart and slipped into the slots 17 in the hexagonal portion 12 of the shield body 10. When the shield is applied to the spark plug 15 the ends 30 of the snap ring 29 are pushed apart slightly by a screw driver or other tool and the assembly pressed downward. As the snap ring 29 reaches the bottom of the hexagonal member 14 of the spark plug 15 it snaps into the groove 31 provided at that point on this type of spark plug, and grounds the shield to the plug 15.

The shield is prevented from moving downward under the effects of vibration by reason of its resting on the spark plug flange 13. The snap ring prohibits the accidental withdrawal or removal of the shield by grasping the plug 15, as

previously described. In order to remove the shield, it is merely necessary to spring the ends 30 of the ring 29, and slip it over the hexagonal member 14 by withdrawing the assembly.

The rubber insulator 24 may be extracted from the shield for replacement by pulling it through the opening in the body portion 10 of the shell. To replace the insulator 24 it is only necessary to bend the sleeve portion 26 upward, compress the rubber body portion 25 and push it into position. The sleeve member 26 is guided into the outlet 21 until the insulator assumes the position shown in Figure 1.

In the preferred embodiment of the invention, the outlet 21 is provided with an internal taper 32 at its outer end. A compressible washer 33, having a frustro-conical shape, surrounds the ignition cable 20 and is seated within this taper 32. When the ignition cable 20 is inserted into the outlet 21 and the coupling nut 34 on the ignition conduit 23 is tightened on the thread 22 of the outlet 21, it forces the contact 37 against the electrode terminal 38 of the plug 15 and squeezes the washer 33 between the conduit ferrule 35 and the taper 32. This pressure forces the washer 33 into the insulation 36 of the ignition cable 20, forming a seal at this end of the spark plug shield.

It is clear, from an examination of Figure 1, that the volume of air about the plug is small as compared to prior types of shield. The condensation of water-vapor within the chamber when the plug cools is therefore kept at a minimum. The construction and use of the rubber insulator 24 permits of the small chamber around the plug while providing adequate radio shielding.

The use of this shield in the field without recourse to special tools is aided by the ceramic sleeve 39 which is slipped over the contact end of the ignition cable 20. This sleeve 39 is provided with a pierced wall 40 integral therewith and spaced from the front end thereof. A hollow rivet 41 is peened over within the bore of the sleeve wall 40 and a contact spring 37 engaged upon a flange 42 of said rivet 41. This assembly is applied to the ignition wire 43 by the simple expedient of stripping the insulation 36 from the end of the cable, passing the exposed wire through the central bore 44 of the rivet 41 and flaring the strands of the wire 43 outwardly and back upon the head of the rivet 41. The assembled terminal may now be slipped into the outlet sleeve 26 of the spark plug shield.

The small amount of clearance required by the locking device on this shield makes it especially adaptable for use on engines where the plug is placed within a deep recess or wall within the cylinder head. The shape of the retaining ring 29 makes it possible to quickly release it and remove the shield by using a screw driver or other tool. This operation, too, may be performed in a constricted space.

Having thus fully described the invention, what is claimed as new and desired to be secured by Letters Patent of the United States, is:

1. In a spark plug shield, a metal shield body closed at its upper end and having its open end formed into a hexagonal shape, each corner of which is provided with a horizontal slot piercing said corners and spaced from the end thereof, a metal lateral outlet thereon and a snap ring embracing the said shield and insertable within the said slots to lock the shield to a spark plug.

2. In a spark plug shield, a metal shield body closed at its upper end and having its open end formed into a hexagonal shape, each corner of which is provided with a horizontal slot piercing said corners and spaced from the end thereof, a metal lateral outlet thereon having an external thread and an internal taper on the outer end thereof and a snap ring insertable within the said slots to lock the shield to a spark plug.

3. In a spark plug shield, a metal shield body closed at its upper end and having its open end formed into a hexagonal shape, a hollow dielectric member provided with a thinned rim and an internal chamfer at the lower end thereof, disposed within and conforming to the shape of the said shield and outlet and a snap ring embracing the said shield and adapted to lock the shield to a spark plug.

4. In a spark plug shield, a metal shield body closed at its upper end and having its open end formed into a hexagonal shape each corner of which is provided with a horizontal slot piercing the said corners and spaced from the end thereof, having an external thread and an internal taper on the outer end thereof, a hollow dielectric member disposed within and conforming to the shape of the said shield and outlet and a snap ring embracing the shield and insertable within the said slots to lock the shield to the spark plug.

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