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EXPLOSIONPROOF SHIELDED SPARK PLUG

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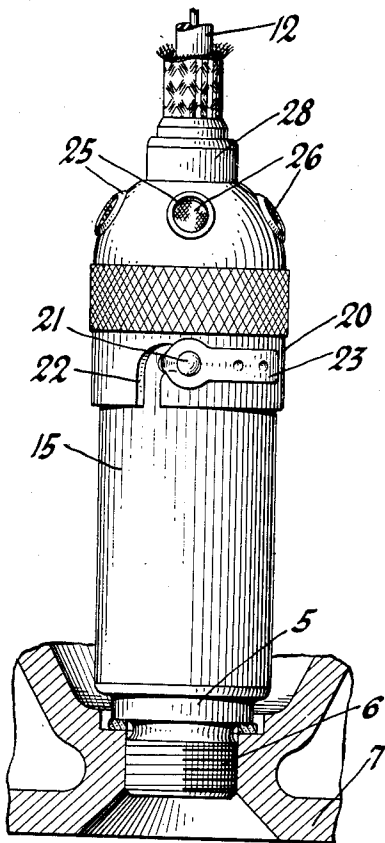


Fig. 1

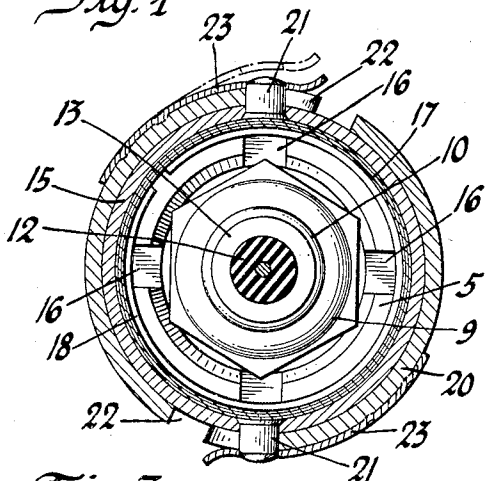


Fig. 3

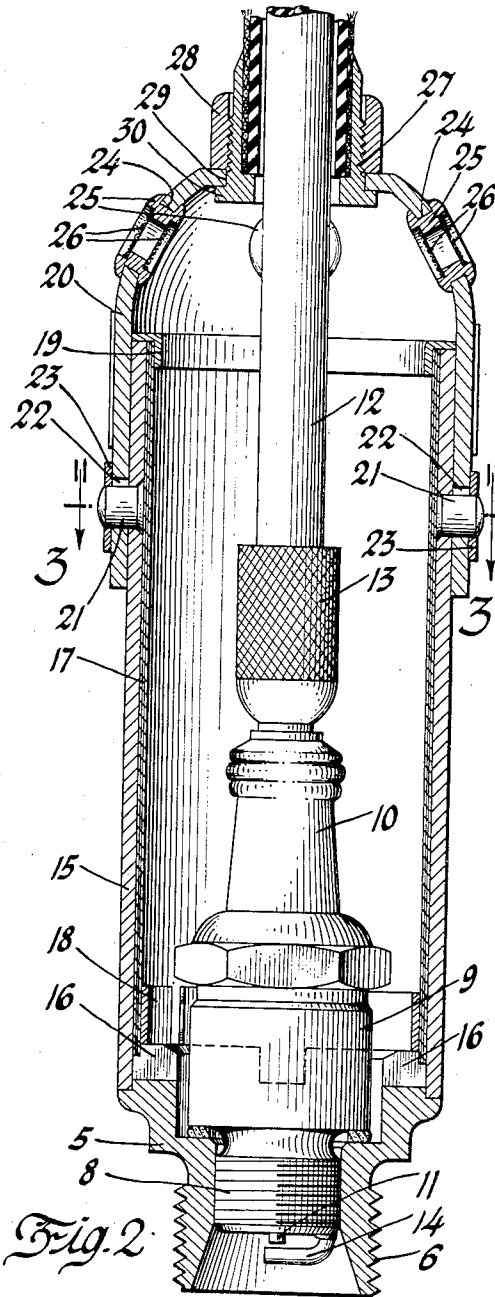


Fig. 2

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EXPLOSIONPROOF SHIELDED SPARK PLUG

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7 Claims. (Cl. 123—169)

My invention relates to spark plug shields designed to function as safety devices, to prevent high tension flashes between the central insulated electrode of the plug and the grounded shell thereof from igniting inflammable gas laden atmosphere surrounding the engine with which the plug is used. Such shields are especially desirable, and are in fact necessary for safety sake, when internal combustion engines are used in oil and natural gas pumping stations where the surrounding atmosphere contains large quantities of natural gas, vapors of easily volatile hydrocarbons, or like inflammable ingredient; in which service unavoidable flashes from the central electrode to the shell of the plug are likely to ignite the gas laden atmosphere and cause serious explosions, especially when as is often necessary the engine is required to operate in enclosed and poorly ventilated spaces.

The drawing accompanying and forming a part of this application illustrates the preferred form of my invention, and the particular features wherein the same consists are particularly pointed out in the concluding claims.

In the drawing:

Figure 1 is a view showing my improved spark plug shield in side elevation, and about its natural size.

Figure 2 is a view showing a section of the same upon a vertical central plane, and enlarged to about twice its natural size, a spark plug similarly enlarged being shown within the shield.

Figure 3 is a view showing a section upon a transverse plane indicated by the line 3—3, Figure 2, looking down.

Referring to the drawing, the numeral 5 designates a metallic base which is externally threaded at 6 to screw into a threaded hole in the head 7 of an internal combustion engine, and is threaded internally to receive the ordinarily threaded lower end 8 of a spark plug the metallic shell or casing 9 of which is hollow to receive and hold the insulating member 10 of the plug. Extending through a passage in this insulator is the central insulated electrode of the plug, the lower end of which appears at 11; and a high tension supply cable 12 extends into the shield and is connected to the upper end of the central electrode by means of any suitable connector 13, to thereby supply high tension current thereto. The shell electrode is indicated by the numeral 14, the same being grounded upon the base 5 and through it to the cylinder head 7 as will be understood.

The numeral 15 designates a cylindrical metallic

casing the lower end of which is secured to the base 5 as by being welded thereto, and which casing is sufficiently strong to resist the pressure due to ignition and explosion of such inflammable gas as may be present inside the shield; and which gas when present is practically certain to be ignited by unavoidable flashes between the central electrode and the shell of the plug if and when such flashes occur. As a matter of course such "flash over" while unavoidable, is not a normal or contemplated incident to the operation of the plug; but the same nevertheless occurs when the plug is in use, and when it does occur inflammable atmosphere about the engine is likely to be ignited by flame following the ignition of inflammable gas inside the shield and issuing therefrom; often with disastrous consequences such as damage to adjacent objects, injury to persons in the vicinity, the starting of dangerous conflagrations, and similar objectionable events which it is important to avoid. The upper end of the base 5 is provided with recesses 16 which lie within the lower end of the casing 15 whereby the shield may be screwed into a threaded hole in a cylinder head, or removed therefrom, by a suitable spanner wrench; and the spark plug itself may be removed from the base without removing the shield from the cylinder head by a suitable socket wrench engaging the usual hexagonal upper end of the plug.

Arranged within the casing 15 is a lining 17 of insulating material, the same being tubular in form and made, preferably, from sheet mica. The lower end of this lining is protected from injury during the assembling or removing of the shield from the cylinder head by an expandible ring 18; and the upper end thereof is similarly protected by a flanged ring 19 which is preferably welded to the upper end of the casing 15 and which flanged ring encloses the upper edge of said lining. In making the shield illustrated the tubular insulating lining 17 is placed in the casing before the lower end thereof is welded to the base 5 as will be understood.

The numeral 20 designates a cap or closure for the upper end of the casing 15, the same being detachable from the casing but held securely locked thereupon so as to resist pressure due to the ignition of inflammable mixture inside the casing; this result being attained by a bayonet joint provided by lugs 21 carried by the casing, and slots 22 in the cap wall which receive said lugs whereby a strong but readily separable joint or connection is provided be-

tween the cap and the casing. Spring clips 23 welded to the cap wall, and having holes at their extremities which fit over the ends of the lugs 21 as shown, prevent rotation of the cap and hold the same in locked position upon the casing; while at the same time providing for convenient removal of the cap by disengaging the free ends of the clips from the lugs and rotating the cap, as will be understood.

10 The upper end of the cap 20 is provided with one or more holes 24 within which tubular bushings 25 are secured as by upsetting their two ends as shown. These bushings are recessed to provide seats for the peripheries of wire gauze screens 26 or equivalent members having holes in them so small in diameter that flame will not pass through them to outside the shield; there being preferably two such elements for each bushing the peripheries of which are brazed or otherwise secured to the seats. The bushings and screens serve to relieve the pressure produced by the ignition of inflammable gas inside the shield, and due to flash over from the central insulated electrode of the plug to the grounded casing thereof, the supporting base 5 or the grounded casing 15 as hereinbefore explained; and the wire gauze screens themselves prevent the propagation of flame due to the ignition and burning of such inflammable mixture to the surrounding atmosphere which commonly contains inflammable gases which, if ignited, might result in dangerous explosions as hereinbefore explained.

A tight joint is provided between the upper end of the cap 20 and the supply cable 12 by a flanged tubular threaded sleeve 27 the internal diameter of which corresponds closely with the external diameter of the cable, and through which sleeve the cable extends, and a tubular nut 28 which engages the exterior of said sleeve and clamps the wall of the cap around the opening 29 through which the sleeve extends between the lower end of said nut and the flange 30 at the inner end of the sleeve and inside the cap 20.

Having thus described and explained my invention I claim and desire to secure by Letters Patent:

1. In a spark plug shield of the class described, a metallic casing tubular in form and surrounding the upper end of a spark plug; a detachable cap closing the open upper end of said casing, and which cap has an opening through which a cable may extend to supply current to the insulated electrode of a spark plug to be shielded; an opening through which pressure due to ignition of inflammable gas inside said shield is relieved; and a piece of wire gauze over said opening for preventing the propagation of flame to the surrounding atmosphere if and when an inflammable gas within said shield is ignited.

2. In a spark plug shield of the class described, a metallic casing tubular in form and surrounding the upper end of a spark plug; a detachable cap closing the open upper end of said casing, and which cap has an opening through which a cable may extend to supply current to the insulated electrode of a spark plug to be shielded; a tubular bushing carried by said cap and through which pressure due to ignition of inflammable gas inside said shield is relieved; and a piece of wire gauze carried by said tubular bushing for preventing the propagation of flame to the surrounding at-

mosphere if and when an inflammable gas within said shield is ignited.

3. In a spark plug shield of the class described, a metallic base externally threaded to screw into an opening in the head of an internal combustion engine cylinder, and having an internally threaded opening for receiving a spark plug to be shielded; a metallic casing tubular in form and the lower end of which is secured to said base; a detachable cap closing the open upper end of said casing, and which cap has an opening through which a cable may extend to supply current to the insulated electrode of a spark plug supported by said base; and means for relieving pressure due to ignition of inflammable gas inside said shield and for preventing the propagation of flame to the surrounding atmosphere if and when an inflammable gas within said shield is ignited.

4. In a spark plug shield of the class described, a metallic base externally threaded to screw into an opening in the head of an internal combustion engine cylinder, and having an internally threaded opening for receiving a spark plug to be shielded; a metallic casing tubular in form and the lower end of which is secured to said base; a detachable cap closing the open upper end of said casing, and which cap has an opening through which a cable may extend to supply current to the insulated electrode of a spark plug supported by said base; an insulating material lining within said casing; a ring secured to the upper end of said casing and enclosing the upper edge of said lining; a second ring within the lower end of said lining and adjacent the upper end of said base; and means for relieving pressure due to ignition of inflammable gas inside said shield and for preventing the propagation of flame to the surrounding atmosphere if and when an inflammable gas within said shield is ignited.

5. In a spark plug shield of the class described, a metallic base externally threaded to screw into an opening in the head of an internal combustion engine cylinder and having an internally threaded opening to receive a spark plug, and the upper end of which base is provided with recesses whereby it may be screwed into and removed from the opening aforesaid in a cylinder head; a metallic casing tubular in form and the lower end of which is welded to the upper end of said base; a cap closing the open upper end of said casing, and which cap has an opening through which a cable may extend to supply current to the insulated electrode of a spark plug supported by said base; means for providing a separable locking connection between the upper end of said casing and said cap; and means for relieving pressure due to ignition of inflammable gas inside said shield and for preventing the propagation of flame to the surrounding atmosphere if and when an inflammable gas within said shield is ignited.

6. In a spark plug shield of the class described, a metallic casing tubular in form and surrounding the upper end of a spark plug; a cap closing the open upper end of said casing, and having an opening through which a cable may extend to supply current to the insulated electrode of a spark plug to be shielded; means for providing a separable locking connection between the upper end of said casing and said cap; and means for relieving pressure due to ignition of inflammable gas inside said shield and for preventing the propagation of flame to the surrounding at-

mosphere if and when an inflammable gas within said shield is ignited.

7. In a spark plug shield of the class described, a metallic casing tubular in form and surrounding the upper end of a spark plug; a cap closing the open upper end of said casing, and which cap has an opening through which a cable may extend to supply current to the insulated electrode of a spark plug to be shielded; means for providing a separable locking connection between

the upper end of said casing and said cap; a tubular bushing carried by said cap and through which pressure due to ignition of inflammable gas inside said shield is relieved; and a piece of wire gauze carried by said tubular bushing for preventing the propagation of flame to the surrounding atmosphere if and when an inflammable gas within said shield is ignited.

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