Sept. 27, 1960 R. C. ZELLER 2,954,495

INSULATOR ELECTRODE ASSEMBLY FOR SPARK PLUGS AND METHOD OF FORMING THE SAME

Filed March 25, 1957

FIG.1.

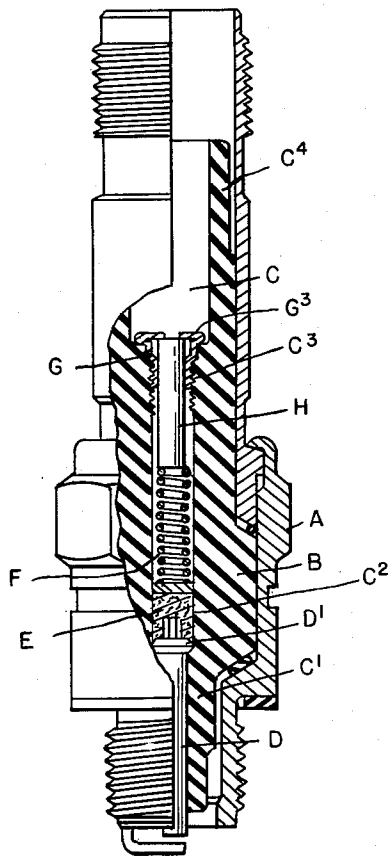
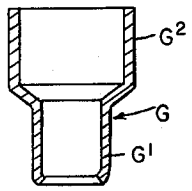


FIG.2.



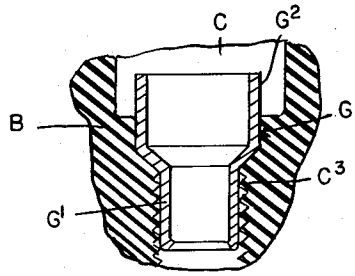


FIG.3.

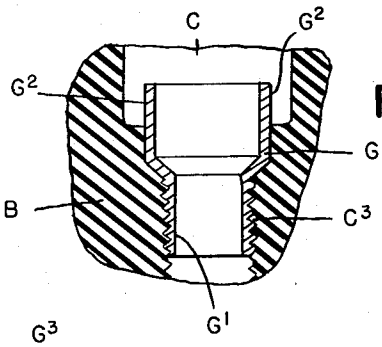
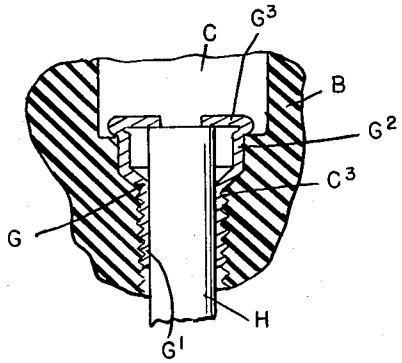


FIG.4.

FIG.5.



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United States Patent Office 2,954,495
Patented Sept. 27, 1960

2,954,495

INSULATOR ELECTRODE ASSEMBLY FOR SPARK PLUGS AND METHOD OF FORMING THE SAME

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Filed Mar. 25, 1957, Ser. No. 648,025

5 Claims. (Cl. 313—136)

The invention relates to spark plugs and more particularly to the construction of the electrode insulator assembly thereof which is of that type in which the electrode proper occupies only the inner portion of the central longitudinal passage through the insulator. With such constructions it is customary to form an electrically conductive hermetic seal in the passage contacting the outer end of the electrode and with a helical spring bearing against said seal which constitutes a portion of the electrical conductor thereto. An abutment for said spring is also within the passage and with certain constructions this is formed by a threaded stud engaging threads in a portion of the wall of the passage. However, it has been found difficult to form an insulator with threads sufficiently accurate to receive a standard threaded stud screwed into engagement therewith.

It is the object of the invention to form an electrically conductive abutment within the insulator which is of a character to facilitate the assembly of the associated parts and will form good electrical contact on opposite sides thereof. To this end the invention consists in the construction as hereinafter set forth.

In the accompanying drawings:

Fig. 1 is a sectional side elevation of a spark plug of my improved construction.

Figs. 2, 3, 4 and 5 are enlarged longitudinal sections through the abutment eyelet and the portion of the insulator with which it is engaged.

The spark plug may be of any standard type including the metallic casing A and the insulator B secured therein in any suitable manner. The central longitudinal passage C through the insulator has an inner end portion C′ for receiving the electrode D which has a head D′ in a larger diameter portion C^2 of said passage. An electrically conductive hermetic seal E is in this portion in contact with the head D′ and may be of any suitable construction. Also, within this portion C^2 is a helical spring F forming a portion of the conductor for supplying current to the electrode.

As above stated the abutment for the spring has heretofore been formed by a threaded stud screwed into engagement with threads formed in the insulator. To avoid the objections to such construction I have devised an improved form of an abutment consisting essentially of a metallic eyelet G. This has a portion G′ which is placed within a threaded portion C^3 formed in the insulator and a larger diameter portion G^2 which is within the larger outer portion C^4 of the passage C. To engage the eyelet with the threads C^3, the portion G′ is originally of a diameter for longitudinal insertion within this portion and is then radially expanded in any suitable way, such as burnishing, spinning, etc. This will force the metal into the threads of the insulator to exactly fit the same regardless of any irregularities therein. When thus placed in position the eyelet is open ended which permits of insertion therethrough of the spring F and any other conductive element, such as the resistor H. The portion

G^2 is then turned inward to form the abutment G^3 which contacts with the resistor H and also the conductive element (not shown) within the portion C^4 of the passage.

What I claim as my invention is:

1. In a spark plug, an insulator having a central longitudinal passage enlarged at one end to form a shoulder and provided adjacent said shoulder with a plurality of internal convolutions having the irregularities characteristic of convolutions formed in insulator material, an electrode secured at the opposite end of said passage by an electrically conductive hermetic seal, an electrical conductor element extending from said seal toward said shoulder, and a thin-walled hollow cylindrical metallic eyelet within said passage being provided with a plurality of external convolutions having irregularities precisely complementary to the irregularities in the internal convolutions of said insulator, said external convolutions having the metallurgical characteristics of expanded metal, said eyelet being radially expanded into permanently interlocking engagement with said internal convolutions thereby exactly fitting the same, said eyelet having an inwardly turned portion forming an abutment for said conductor element.

2. In a spark plug, an insulator having a central longitudinal passage enlarged at one end to form a shoulder and provided adjacent said shoulder with a plurality of internal threads having the irregularities characteristic of threads formed in insulator material, an electrode secured at the opposite end of said passage by an electrically conductive hermetic seal, an electrical conductor element extending from said seal toward said shoulder, and a thin walled hollow cylindrical metallic eyelet with its opposite ends of different diameters connected by a shoulder engaging said insulator shoulder, the smaller diameter portion being provided with a plurality of external threads having irregularities precisely complementary to the irregularities in the internal insulator threads, said external eyelet threads having the metallurgical characteristics of expanded metal, said smaller diameter portion of said eyelet being radially expanded into permanently interlocking engagement with said internal insulator threads and the larger diameter portion being turned inwardly into abutting engagement with said conductor element.

3. An insulator electrode assembly for a spark plug comprising an insulator having a central longitudinal passageway enlarged at one end with an intermediate conical seat and provided with a plurality of internal threads in the smaller portion of the passageway adjacent said conical seat, said internal threads having the irregularities characteristic of internal threads formed in insulator material, an electrode secured at the opposite end of said passageway by an electrically conductive hermetic seal, an electrical conductor element extending from said seal toward said enlarged passageway including a resistor and a spring in axial alignment, and a thin-walled hollow cylindrical metallic eyelet with its opposite ends of different diameters connected by a conical portion engaging said conical seat, the smaller portion of said eyelet being provided with external threads having irregularities precisely complementary to the irregularities of said internal insulator threads, said external eyelet threads having the metallurgical characteristics of expanded metal, said smaller portion of said eyelet being radially expanded into permanently interlocking engagement with the internal threads in said insulator, and the larger portion of said eyelet being turned inwardly to form a flange retaining said resistor and spring from axial displacement while leaving a central opening and said eyelet also being turned outwardly into said enlarged portion of the insulator passageway.

4. The method of forming an electrically conductive

abutment within a spark plug insulator comprising forming the insulator with a central longitudinal passage therethrough having a threaded portion in the wall thereof, longitudinally inserting a metallic eyelet within said threaded portion, radially expanding the same to fill between the threads thereof and to hold the eyelet from displacement, and subsequently after insertion of a conductive element through said eyelet turning inward an end portion thereof which is free from said threads to form an abutting surface.

5. The method of forming an insulator electrode assembly for a spark plug comprising forming the insulator with undercut portions in the internal wall of the central passageway, longitudinally inserting a metallic eyelet into alignment with said undercut portion of the insulator, radially expanding the metal of said eyelet to permanently interlock with said undercut portions of the insulator to

hold the eyelet from displacement, longitudinally inserting through the end of said eyelet opposite said expanded end a conductor element including both a resistor and a spring, and subsequently turning inwardly the end of said eyelet through which said resistor and spring have been inserted to form an abutment retaining said resistor and spring from axial displacement.

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