July 26, 1960 O. A. CHRISTENSON 2,946,912

SPARK PLUGS

Filed June 18, 1959

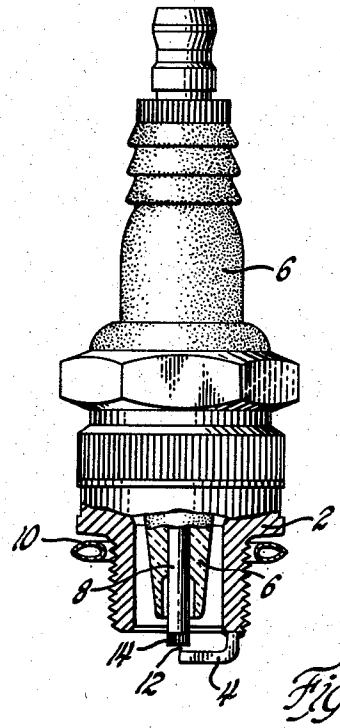


Fig. 1

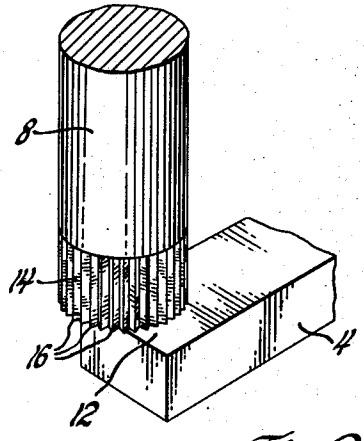


Fig. 2

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# SPARK PLUGS

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2 Claims. (Cl. 313—141)

The subject matter of the present invention is an improved spark plug and, more particularly, an improved spark plug electrode structure and arrangement. Spark plugs of the present invention find utility not only in conventional automobile and truck engines but also in smaller output engines of the type used in power lawn mowers, outboard marine motors and the like.

The invention has as one of its objects the provision of a spark plug which will provide for easier engine starting. More specifically, the object of the invention is the provision of a spark plug the electrode structure and arrangement of which is such that it provides for easier engine starting without sacrifice in spark plug life or durability. Other objects and advantages of the invention will appear more clearly from the following description of a preferred embodiment thereof made with refereence to the accompanying drawings in which:

Figure 1 is a side view in partial section of a spark plug constructed in accordance with the invention; and

Figure 2 is a perspective view of the lower end of the spark plug shown in Figure 1, but in larger scale.

Referring now to the drawing, the spark plug shown comprises a generally tubular shaped outer metal shell 2 having a ground electrode 4 secured to and extending inwardly from the lower end thereof, a generally tubular ceramic insulator 6 secured tightly within the shell, and a center electrode 8 extending through the insulator centerbore, the lower end of the center electrode being in spaced relationship with the ground electrode. A conventional threaded section and a copper gasket 10 at the bottom end of the shell provide for sealed securement of the spark plug into an internal combustion engine.

Further now with respect to the electrode structure and arrangement, the ground electrode 4 consists of a flat nickel wire which is welded to the underside of the shell 2 and which extends downwardly and then inwardly and terminates below and at about the center of the flat bottom surface of the nickel center electrode 8. Hence, as can best be seen from Figure 2, the spark gap of the spark plug is formed between the flat parallel opposed surfaces of the bottom of the centerwire 8 and the flat top surface 12 at the free end of the ground electrode 4. Further in accordance with the invention, the lower end portion 14 of the center electrode is generally cylindrical and is formed with a plurality of elongated serrations which extend axially of the center electrode such that the flat end surface of the center electrode presents a plurality of circumferentially arranged outwardly extending points 16 to the ground electrode. Preferably the elongated serrations should be such that the angle defined by each of the outwardly extending points is not greater than approximately 90°. Also, for optimum performance over an extended period of plug operation the number of serrations and therefore points should be relatively large, preferably not less than eight. These serrations on the center electrode function to improve



the starting characteristics of an engine in which the plugs are used.

An important feature of the spark plug of this invention is that wear or erosion of the points on the center electrode does not increase the size of the gap between the center electrode and the ground electrode. Hence, even after a very extended period of operation during which some or all of the points may become eroded or worn smooth, the spacing between the ground electrode and the center electrode remains substantially the same and hence the spark plug remains operative and efficient. Also, by way of the plurality of points and the arrangement shown, the advantageous engine starting characteristics continue over a very extensive period of the spark plug's life. In effect then, the provision of the serrations on the center electrode in accordance with the present invention provides the spark plug with greatly improved starting characteristics during an extended period and then in the later life of the plug after the serrations may have become worn, the plug retains an efficiency which is as high as present conventional plugs.

It will be understood that while the invention has been described specifically with reference to a particular embodiment thereof, various changes and modifications may be made all within the full and intended scope of the claims which follow.

I claim:

1. A spark plug comprising a metal shell, a ceramic insulator secured in said shell having a centerbore extending therethrough, a metal center electrode wire secured in the centerbore, said wire having a lower portion with a flat lower end surface exterior of said insulator, and a metal ground electrode wire welded to the lower end of said shell and having a flat elongated straight end portion extending radially inwardly and terminating in spaced parallel relationship with the flat lower end surface of said center electrode wire, the lower portion of said center electrode wire being generally cylindrical and of substantially uniform diameter along its axis and having a plurality of circumferentially arranged serrations each of V-shaped cross section such that the flat end of said center electrode wire presents a plurality of circumferentially arranged outwardly extending points to the flat end portion of said ground electrode.

2. A spark plug comprising a metal shell, a ceramic insulator secured in said shell having a centerbore extending therethrough, a metal center electrode wire secured in the centerbore, said wire having a lower portion with a flat lower end surface exterior of said insulator, and a metal ground electrode wire welded to the lower end of said shell and having a flat elongated straight end portion extending radially inwardly and terminating below and at about the center of the flat end surface of said center electrode wire in spaced parallel relationship therewith, the lower portion of said center electrode wire being generally cylindrical and of substantially uniform diameter along its axis and having a plurality of elongated circumferentially arranged axially extending serrations each of V-shaped cross section such that the flat end of said center electrode wire presents a plurality of circumferentially arranged outwardly extending points to the flat end portion of said ground electrode wire.

References Cited in the file of this patent

UNITED STATES PATENTS

| | | |
|---|---|---|
| 1,417,876 | Wood | May 30, 1922 |
| 1,483,673 | O'Connell | Feb. 12, 1924 |
| 1,518,248 | Broluska et al. | Dec. 9, 1924 |