July 11, 1944. G. S. WEINERTH 2,353,620

SPARK PLUG

Filed June 19, 1942

Fig. 1.

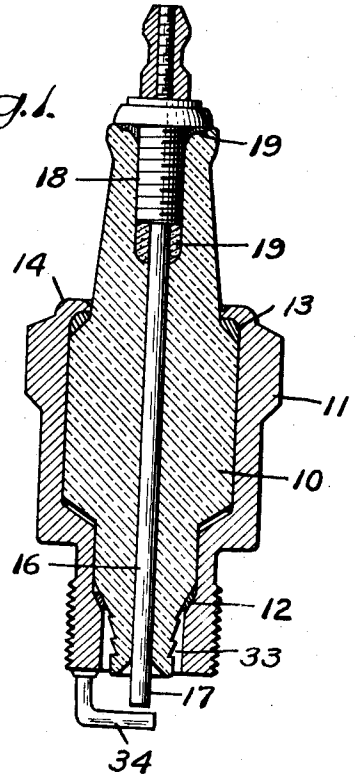


Fig. 2.

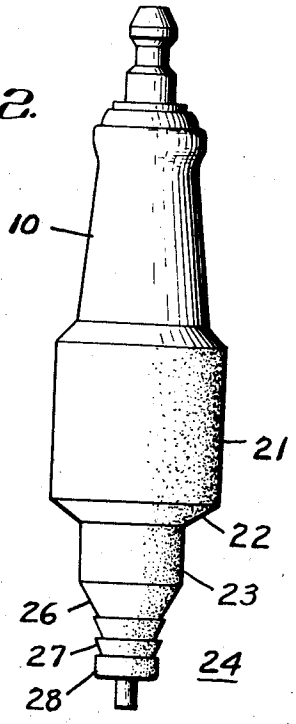


Fig. 3

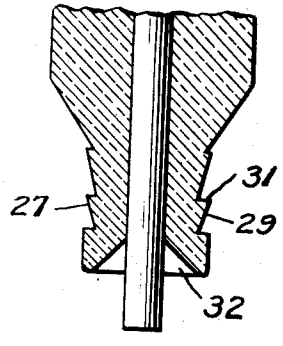
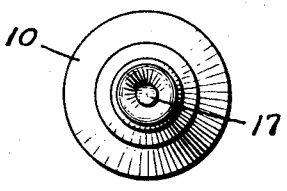


Fig. 4.



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2,353,620

SPARK PLUG

George S. Weinerth, Reading, Pa.

Application June 19, 1942, Serial No. 447,721

2 Claims. (Cl. 123—169)

This invention relates to spark plugs, and more particularly to an improved construction at the firing end of a spark plug, whereby the tendency of current to pass from the central electrode along the insulator tip and to the metallic shell of the plug is minimized.

I have found that there is a tendency in conventional spark plugs having a smooth surfaced insulator tip for oil or gas containing a certain amount of moisture to cling to the tip surface and permit current supplied to the central electrode to pass therealong to the metallic shell of the plug. This decreases the power of the spark and results in inefficient operation of the motor.

It is a primary object of my invention to provide an improved spark plug which is highly efficient in operation.

Another object of my invention is to provide a spark plug having an improved construction at the firing end of the plug, whereby the tendency of oil or moisture containing gas to conduct current directly to the metallic shell of the plug is minimized.

Another object of my invention is to provide a spark plug having an improved construction at the firing end of the plug, whereby the insulator tip is maintained relatively hot to prevent accumulation of carbon and the like at this area.

Another object of my invention is to provide a spark plug which has a highly efficient self-cleaning action at the firing end of the plug.

Another object of my invention is to provide a spark plug of the above type, which is of simple construction and highly efficient in operation.

The present invention is an improvement over spark plugs shown and described in my United States Patent No. 2,251,179, which issued July 29, 1941, and in my co-pending application Serial No. 391,665, filed May 3, 1941, although the invention is not limited to spark plugs shown and described in the aforesaid patent and application.

According to the invention, the metal shell at the firing end of the plug is spaced from the insulator tip to provide a pocket therebetween and a metallic spacing gasket at the upper end of the pocket conducts heat from the combustion gases to the shell for dissipation in the usual manner. I have found that if the walls of the insulator tip are smooth that there is a tendency for oil and/or gas containing moisture to conduct current from the central electrode directly to the metallic gasket or shell. In my improved construction, the insulator tip is formed to provide a series of annular serrations which break up the continuity of oil or gas tending to cling to or travel along the tip surface, and thereby prevent the passage of current directly to the shell from the central electrode. Further, the lowermost portion of the insulator tip is maintained relatively hot during sparking of the plug, and is thereby kept substantially free of carbon deposit.

The drawing illustrates embodiments of the invention, and the views therein are as follows:

Figure 1 is a longitudinal sectional view of a spark plug embodying my invention,

Figure 2 is an elevational view of the plug illustrated in Figure 1 with the shell removed for clearness of illustration,

Figure 3 is an enlarged fragmentary sectional view of the insulator tip and central electrode of the plug illustrated in Figures 1 and 2, and

Figure 4 is a bottom plan view of the structure illustrated in Figure 2.

Referring now to the drawing, I have illustrated my invention as applied to a spark plug of the type generally illustrated in my aforesaid co-pending application Serial No. 391,665. An insulator 10 extends through a metallic shell 11, the shell and insulator being provided with inclined shoulders at the lower portions thereof which receive a metallic sealing and spacing gasket 12 therebetween. A second sealing and spacing gasket 13 is supported between oppositely inclined shoulders at the upper portion of the insulator, and the shell is assembled with the insulator by crimping the upper peripheral edge of the shell over gasket 13, as indicated at 14. A central electrode 16 is projected through the insulator, and preferably extends somewhat beyond the insulator tip, as indicated at 17.

The particular manner of assembling the central electrode with the insulator constitutes no essential part of the present invention, although I preferably employ the means more fully described in my aforesaid co-pending application wherein a terminal 18 threadedly engages both the electrode and shell, and cement 19 is employed to further secure these parts in assembled relation and provide an effective seal at this zone.

The insulator, best illustrated in Figure 2, comprises a generally cylindrical central portion 21, a tapering shoulder 22, a reduced cylindrical portion 23 and a tip portion, generally indicated at 24. The tip portion comprises a generally frusto-conical portion 26, a plurality of annular serrations 27 of generally saw-tooth form and a cylindrical end portion 28. It will be noted that the serrations 27 comprise side walls 29 which diverge upwardly or towards the terminal end of the

plug, and end walls **31** which extend at substantially right angles to the axis of the plug. Also, I preferably provide a generally frusto-conical cavity **32** at the base of the tip.

Although I have shown two serrations **27**, it is understood that a greater number may be formed, if desired.

I have found that by providing an insulator tip of the type described that oil or gas containing moisture, which is forced into pocket **33** formed between the tip portion **24** and shell **11**, is deflected or broken up by the serrations **27**, so that any tendency of a continuous film to form on the surface of the insulator tip is prevented. Thus, the passage of any current which otherwise might tend to flow from the central electrode **16** along the surface of the insulator tip to the gasket **12**, and thence to the shell **11** is prevented.

It is obviously highly desirable that all the current supplied to the central electrode be used for effecting a spark between the central electrode and the ground electrode **34**, and I have found that the construction described breaks up the continuity of any film of a conducting medium, which might otherwise tend to conduct a portion of the current along the insulator tip to the shell. It is desirable that a sharp corner be effected at the juncture of side wall **29** with end wall **31**, and if this portion of the insulator is left unglazed, a sharper edge is provided than when such portion is glazed.

It will be noted that combustion gases may pass around end portion **28** of the insulator and this portion will be maintained relatively hot and free of carbon deposit or the like.

I contemplate that the shell **11** may be of the type illustrated in my aforesaid copending application, wherein slots are provided at the firing end of the shell and extend through the walls thereof to increase the turbulent action of the combustion gases at this zone of the plug to maintain the insulator tip and side walls free of carbon deposit. As explained in the aforesaid application, this results in a fixed hot spark at all times, and increases the efficiency and life of the plug.

Although I have shown and described a preferred form of my invention, I contemplate that numerous and extensive departures may be made therefrom without departing from the spirit of my invention and the scope of the appended claims.

The invention is hereby claimed as follows:

1. A spark plug comprising a metallic shell, an insulator projected through the shell having a reduced tip portion spaced from the shell to form a pocket therebetween, and the walls of the tip portion being serrated, whereby the continuity of a current conducting film, which might tend to adhere to said walls, is broken, said tip portion having a conical recess in the outer end thereof.

2. A spark plug comprising a metallic shell, an insulator projected through the shell having a reduced tip portion spaced from the shell to form a pocket therebetween, the walls of the tip portion being serrated, and the serrations comprising side walls diverging towards the terminal end of the plug and end walls extending at substantially right angles to the plug axis.

GEORGE S. WEINERTH.