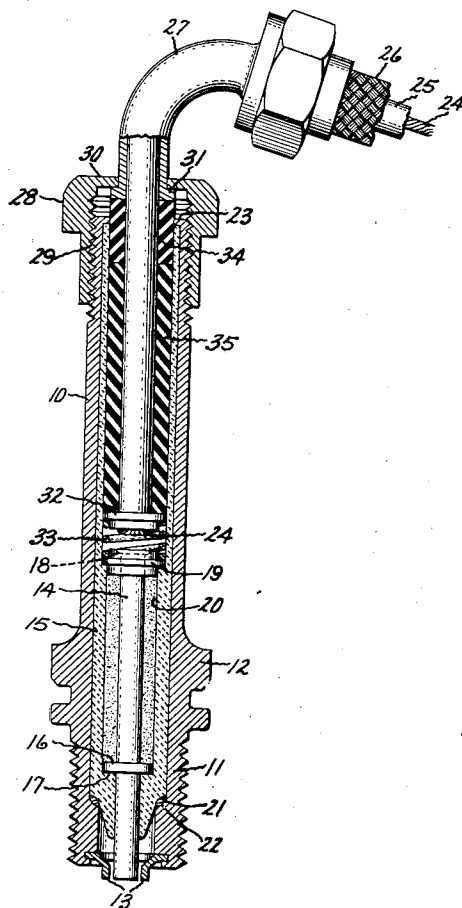


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A. C. WALL
ELECTRICAL DISCHARGE DEVICE

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ELECTRICAL DISCHARGE DEVICE

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5 Claims. (Cl. 315—326)

My invention relates to spark plugs.

An object of my invention is to provide an improved spark plug having a construction which minimizes the possibility of flash-over within the plug by substantially eliminating gas electrical discharge paths between the distribution lead and the shell of the plug.

Further objects and advantages of my invention will become apparent and my invention will be better understood from the following description referring to the accompanying drawing, and the features of novelty which characterize my invention will be pointed out with particularity in the claims annexed to and forming part of this specification.

The drawing is an elevational view, partly in section, of a spark plug and a distribution lead illustrating an embodiment of my invention.

Referring to the drawing, I have shown a spark plug provided with an outer metallic sleeve or barrel 10 threaded at one end 11 for engagement with a complementary threaded opening in an engine block and having an enlarged portion 12 adapted to be engaged by a wrench or similar tool. Grounding electrodes 13 are secured to the shell 10 adjacent the lower threaded end 11 and a central or discharge electrode 14 is supported within the spark plug by a ceramic insulating core 15 of porcelain or similar material. The discharge electrode 14 is formed with a lower flange 16 which engages a complementary shoulder 17 on the insulating core 15 and is provided with a turned-over contact head portion 18 which secures a cap 19 in position over a central opening 20 in the insulating core 15. This central opening 20 in the core 15 between the electrode flange 16 and the cap 19 is filled with a body of compressed or compacted powder. The core 15 is held in position in the shell 10 by engagement adjacent its lower end with a gasket 21 seated on a shoulder 22 formed on the shell 10 and by engagement at the opposite end thereof with a turned-over end 23 of the shell 10.

The desired electrical potential is brought to the central electrode 14 by a distribution lead 24 of electrically conductive material which is insulated by a suitable flexible insulating covering 25 about which an armored metallic shield 26 is arranged. The distribution lead is held in position on the spark plug by a terminal elbow 27 which is secured to the head of the spark plug shell 10 by a nut 28 which threadedly engages a threaded upper end portion 29 of the plug shell 10 and is provided with an annular flange 30 extending over a complementary flange 31 on the

elbow 27. The central spark plug electrode 14 is electrically connected through a coil spring 33 which is connected to the lead 24 through a terminal washer 32.

Under certain atmospheric conditions, such as relatively low pressure, there is a tendency for the voltage to discharge from the lead to the grounded plug shell through any gas discharge path. In order to eliminate corona and arc-over discharges, the flange 31 of the terminal elbow 27 is arranged in engagement with a relatively nondeformable cap element 34 of insulating material arranged in engagement with the upper end of a heat resistant bushing 35 formed of deformable resilient insulating material, such as the composition produced by a mixture of polystyrene and polyisobutylene or "Oppanol" as described in British Patent No. 513,630 (1939). This bushing 35 is arranged about the lead 24 and its insulation 25 within the shell 10 between the electrical connection of the lead 24 to the electrode 14 and the upper end of the shell 10. When the nut 28 is secured in position, it draws the flange 31 of the terminal elbow 27 downwardly into engagement with the upper end of the cap 34 which compresses and deforms the bushing 35 and substantially circumferentially fills a longitudinal portion of the space about the lead within the shell between the terminal washer 32 and the upper end of the shell, thereby eliminating free open gas electrical discharge paths between the shell and the lead, thus effectively sealing the space between the shell and the terminal connection 32. With this arrangement any decrease in air pressure around the plug will tend to cause the air trapped within the plug by the bushing 35 to exert pressure on the bushing and to compress it into more intimate contact with the adjacent surfaces to provide a better seal and to assure against any air discharge paths.

While I have illustrated and described a particular embodiment of my invention, modifications thereof will occur to those skilled in the art. I desire it to be understood, therefore, that my invention is not to be limited to the particular arrangements disclosed, and I intend in the appended claims to cover all modifications which do not depart from the spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. A spark plug including a shell having a grounding electrode, a discharge electrode arranged within said shell, an insulating element

arranged between a part of said discharge electrode and said shell, a distribution lead of conductive material electrically connected to said discharge electrode within said shell, and means including a heat resistant bushing of deformable insulating material arranged between said shell and said electrical connection of said lead to said discharge electrode within said shell, a heat resistant bushing of deformable insulating material arranged between said shell and said electrical connection of said lead to said discharge electrode, and means including a relatively non-deformable element arranged in engagement with said deformable bushing deforming said bushing for substantially filling a portion of the space between said lead connection and said insulating element and for eliminating free open gas electrical discharge paths between said connection and said shell.

2. A spark plug including a shell having a grounding electrode, a discharge electrode arranged within said shell, an insulating element arranged between a part of said discharge electrode and said shell, a distribution lead of conductive material electrically connected to said discharge electrode within said shell, a heat resistant bushing of deformable insulating material arranged between said shell and said electrical connection of said lead to said discharge electrode, and means including a relatively non-deformable element arranged in engagement with said deformable bushing deforming said bushing for substantially filling a portion of the space between said lead connection and said insulating element and for eliminating free open gas electrical discharge paths between said connection and said shell.

3. A spark plug including a shell having a grounding electrode, a discharge electrode arranged within said shell, an insulating element arranged between a part of said discharge electrode and said shell, a distribution lead of conductive material electrically connected to said discharge electrode within said shell, a heat resistant bushing of deformable insulating material arranged within said insulating element about a portion of said lead between said connection of said lead to said electrode and the end of said insulating element away from said electrode, and means including a relatively non-deformable element arranged in engagement with said deformable bushing for deforming said bushing and substantially circumferentially filling a longitudinal

portion of the space about said lead within said insulating element eliminating free open gas electrical discharge paths between said shell and said lead.

4. A spark plug including a shell having a grounding electrode, a discharge electrode arranged within said shell, an insulating element arranged between a part of said discharge electrode and said shell, a distribution lead of conductive material electrically connected to said discharge electrode within said shell, insulation arranged about said lead and extending within said shell about a portion of said lead, a heat resistant bushing of deformable resilient insulating material arranged within said shell about a portion of said lead insulation, and means including a relatively non-deformable cap arranged in engagement with said deformable bushing for deforming said bushing and substantially circumferentially filling a longitudinal portion of said space about said lead insulation within said insulating element eliminating free open gas electrical discharge paths between said shell and said lead.

5. A spark plug including a shell having a grounding electrode, a discharge electrode arranged within said shell, means including an insulating element arranged between a part of said discharge electrode and said shell for supporting said electrode in said shell, a distribution lead of conductive material electrically connected to said discharge electrode within said shell, insulation arranged about said lead and extending within said shell about a portion of said lead, a heat resistant bushing of deformable resilient insulating material arranged between said shell and said electrical connection of said lead to said discharge electrode, and means including a relatively non-deformable element arranged in engagement with said deformable bushing deforming said bushing for substantially filling a portion of the space between said lead connection and said insulating element and for eliminating free open gas electrical discharge paths between said shell and said connection.

ALEXANDER C. WALL.