Dec. 19, 1939. E. B. NOWOSIELSKI 2,184,196

SPARK PLUG

Original Filed Jan. 6, 1936

Fig. 1

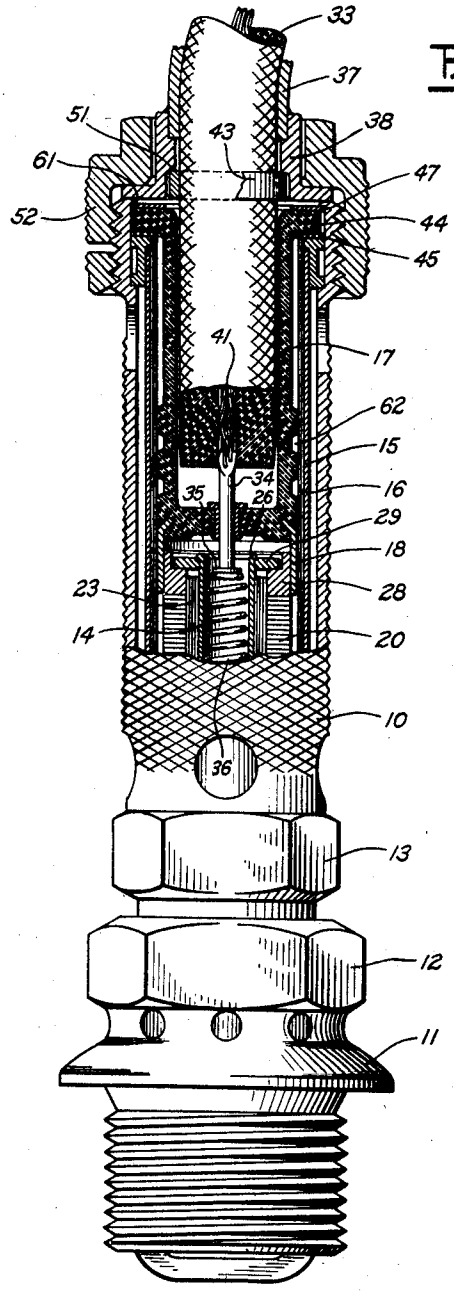


Fig. 2

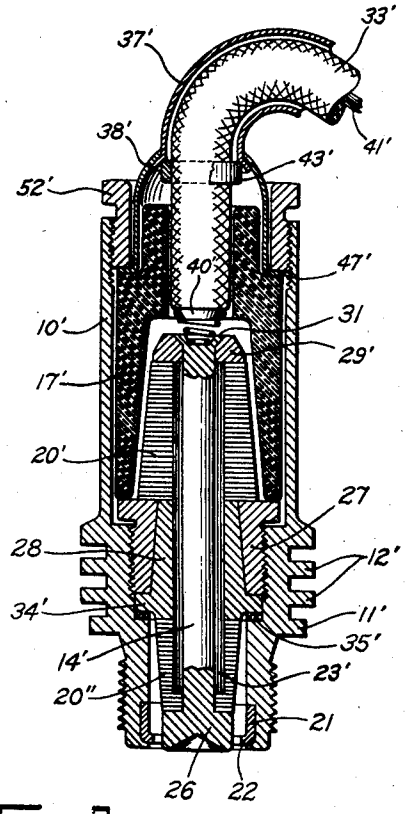
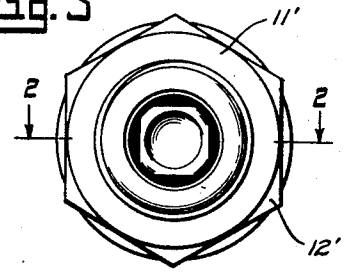


Fig. 3



INVENTOR.
Edward B. Nowosielski
BY
Martin J. Finnegan
ATTORNEY.

Patented Dec. 19, 1939 2,184,196

UNITED STATES PATENT OFFICE

2,184,196

SPARK PLUG

Edward B. Nowosielski, Bloomfield, N. J., assignor to Eclipse Aviation Corporation, East Orange, N. J., a corporation of New Jersey

Original application January 6, 1936, Serial No. 57,810. Divided and this application April 1, 1937, Serial No. 134,396

3 Claims. (Cl. 123—169)

This invention relates to spark plugs, and more particularly to spark plugs of the type wherein the high tension circuit is not only insulated but also "shielded" or screened to prevent interference with the reception of signals in adjacent radio equipment.

Objects of the invention are to provide an improved method of shielding and insulating the high tension circuit of a spark plug, as well as a novel structural combination of parts adapted to cooperate in the attainment of improved shielding and insulating properties.

For example, I provide, for application to a shielding element of the mica sleeve lined type, an improved method of protecting the mica lining, as well as a novel construction of adjacent parts to eliminate the possibility of fraying at the edges of the mica, notwithstanding repeated withdrawals and re-insertions of the connecting cable.

Another object is to secure the cable against the possibility of accidental withdrawal.

Further purposes will appear in the specification and claims.

In the drawing I have illustrated the invention as applied to structures which I regard as conventional but representative of other forms which may be employed, and to which the invention may be applied without departure from the principles of the said invention, as disclosed herein.

Fig. 1 is a longitudinal sectional view of a device embodying the invention;

Fig. 2 is a similar view of a second embodiment; and

Fig. 3 is a transverse end, or bottom plan view of the device of Fig. 2.

Referring first to Fig. 1, the apertured shielding element 10 is shown as an upward extension of the cylinder engaging base or shell 11, there being an intermediate polygonal portion 12 which receives the wrench or other tool for insertion of the plug in the cylinder wall. The lower portion of the element 10 is also shown as provided with a polygonal section 13 facilitating its attachment to the shell 11, but it is to be understood that the two members 10 and 11 may be integral if preferred.

In the space within the element 10, there is a cooling and ventilating chamber surrounding a long thin metallic sleeve 15 lined with a tube 16 of rolled mica constituting the wall of a second annular chamber closed at its upper end by non-conducting sleeve or tube 17 having a metallic skirt 18 surrounding a pair of washers 28, 29 of brass or other compressible metallic material, adapted to exert pressure upon a second insulating body 20 composed of a plurality of compressed mica washers, only part of which are visible in the drawing, and corresponding in structural arrangement to the conventional mica washer assembly as illustrated, for example, at 20' in Fig. 2, and also in Hyland Patent No. 1,950,408, granted March 13, 1934.

Between the mica stack 20 and the center electrode 14 there is the usual rolled mica wrapper 23 which extends upwardly for almost the complete length of the spindle 14, the upper portion thereof being confined with the mica stack 20 when the upper hollow end 26 of the spindle is turned downwardly or upset upon the compressible metallic elements 29 and 28.

Within the hollow upper portion of the spindle 14 there is provided a connecting pin 34 having an enlarged lower part 35 against which the upper end of coil spring 36 engages to urge the chisel edged upper end of the pin into penetrating engagement with the stranded wire cable core 41.

As shown, the insulated cable 33 is adapted to pass through a metal thimble or elbow 37, the latter having a flanged ring 38 soldered to its lower end and pivotable within the detachable coupling member 52 threaded on the end of the shielding element 16. Before attaching the thimble 37 the spacer tube 17 of Bakelite, or other rigid insulating construction, is inserted to fit about electrode connection 34, with its skirt 18 telescoping with washer 28. The upper end of the tube 17 is flanged, as at 44, to rest upon asbestos disc 45 and overlie the upper edges of mica lining 16, and thus protect the mica lining against fraying or bending out of position.

After passing the cable through the elbow thimble 37, a metal bracelet or spacing collar 43 is pressed tightly about the rubber coating of the cable, at a point which is a pre-measured distance from the end of the cable.

Coupling nut 52 and thimble 38, the latter being recessed to form an annular ledge 51, are then moved forward into the assembled relationship shown, wherein thimble 38 serves as a thrust bearing to prevent withdrawal of the cable so long as coupling member 52 remains in place as shown. When the member 52 is unscrewed from the shielding element 10 and drawn back (together with thimble 37, 38) along the cable, the latter may then be withdrawn and inspected, but spacer tube 17 will remain in place due to the fact that the spun-over end 61 of element 10 holds upper metallic washer 47 and flange 44 against displacement.

Preferably spacer tube 17 is grooved circumferentially, as indicated at 62, to facilitate heat dissipation and also to provide space for retention of a binding cement, if it is desired to apply such an auxiliary holding substance.

In Fig. 2 the equivalent spacer tube 17' is shown as being held in place by the flanged base 47' of thimble 38', the latter being a part of metal elbow 37', and in turn held by coupling member 52', when the latter is screwed in position on shield element 10'. Bracelet 43' corresponds in function to bracelet 43 of Fig. 1, and is secured to the cable 33', and by virtue of its engagement with elbow 37', it prevents disturbance of the electrical connection between 40' and 14' so long as coupling nut 52' remains in place as shown. As in Fig. 1, the cable fits loosely within the spacer tube, so that withdrawal of the former does not necessarily disturb the latter.

Referring further to Fig. 2, the plug shell includes a cylinder engaging portion 11', a heat radiating portion 12', and an upper portion 10' which is internally threaded to receive coupling cap 52'. A cup shaped metallic ring 21 is suitably secured to the shell base 11', as by spinning over the base tip in the manner indicated at 22, the ring being of an inner diameter sufficiently large to permit passage therethrough of the longitudinally truncated cylindrical head portion 26 of the central electrode spindle 14'; the purpose of the truncating being to divide the surface of the electrode head into definite, angularly spaced spark paths to the ring 21—there being four such paths as shown.

The heat radiating portion 12' of the shell is internally threaded to receive a correspondingly threaded gland nut 27 adapted to exert sufficient pressure, both laterally and longitudinally, upon the externally flanged and tapered packing element 28 to cause deformation thereof into a gas tight sealing relationship with respect to both the mica enwrapped spindle 14' and the inner wall of the shell 11'—the packing 28 being of softer metal than that of which the nut 27 and shell 11' are composed. A metal washer 29' acts to compress the mica discs 20' and 20'' as well as the parts 14', 27 and 28, and the intervening mica wrapper 23', one against the other, the compression occurring during the act of upsetting the end 31 of the spindle 14' over the top surface of the washer 29', the head portion 26 of the spindle acting to take the axial thrust during the process; it being understood that the assembly (exclusive of shell 11') is braced against a suitable abutment during this compressing process. Then, as the assembly is threaded into the shell, further compression of the flange 34' of the packing 28 occurs, to complete the gas tight seal above referred to. Heat resistant baffle 35' (of asbestos or its equivalent) aids in the deflection of heat flow to the region of the radiating surfaces 12'.

This application is a division of my Patent No. 2,079,561 based upon application No. 57,810, filed January 6, 1936.

What is claimed is:

1. In a spark plug for internal combustion engines, the combination with a central electrode, of a shell surrounding said electrode and having a cylinder engaging portion, a heat radiating portion, and a cap receiving portion, an insulating wrapper surrounding said central electrode, a flanged packing element surrounding said wrapper and engaging the heat radiating portion of said shell for transfer of heat thereto, means engageable with said packing element to establish a gas-tight joint of high heat conductivity between said central electrode and said heat radiating portion of said shell, and a free fitting insulator carried by a portion of said last named means, and terminating in a plane adjacent the said cap receiving portion of the shell.

2. In a spark plug for internal combustion engines, the combination with a central electrode, of a shell surrounding said electrode and having a cylinder engaging portion, a heat radiating portion, and a cap receiving portion, an insulating wrapper surrounding said central electrode, a flanged packing element surrounding said wrapper and having peripheral engagement with the heat radiating portion of said shell for transfer of heat thereto, means engageable with said packing element to establish a gas-tight joint of high heat conductivity between said central electrode and said heat radiating portion of said shell, a free fitting insulator carried by a portion of said last named means, and terminating in a plane adjacent the said cap receiving portion of the shell, and means engageable with both said cap receiving portion and said insulator to retain the ignition cable in current conducting relation to said central electrode.

3. In a spark plug for internal combustion engines, the combination with a central electrode, of a shell surrounding said electrode and having a cylinder engaging portion and a cap receiving portion, a packing element surrounding said central electrode, means engageable with said packing element to establish a gas-tight joint between said central electrode and said shell, a free-fitting insulator carried by a portion of said last-named means, and terminating adjacent the said cap receiving portion of the shell, and means engageable with both said cap receiving portion and said insulator to retain an ignition cable in current conducting relation to said central electrode.

EDWARD B. NOWOSIELSKI.