May 25, 1937. E. B. NOWOSIELSKI 2,081,503

IGNITION APPARATUS

Filed Nov. 5, 1935

Fig. 1

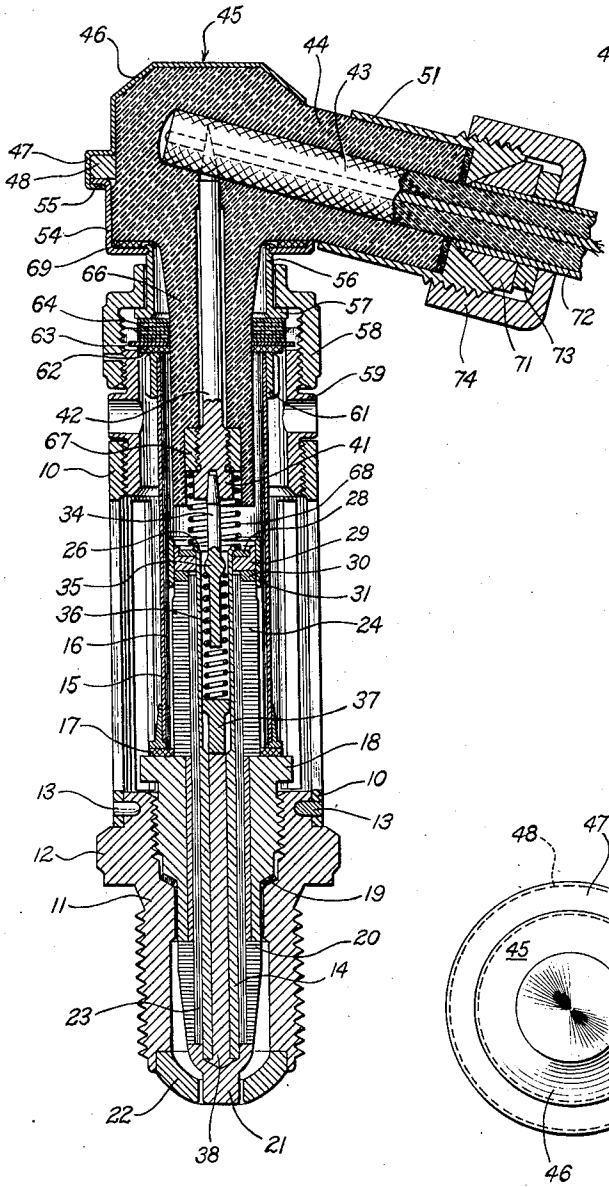


Fig. 3

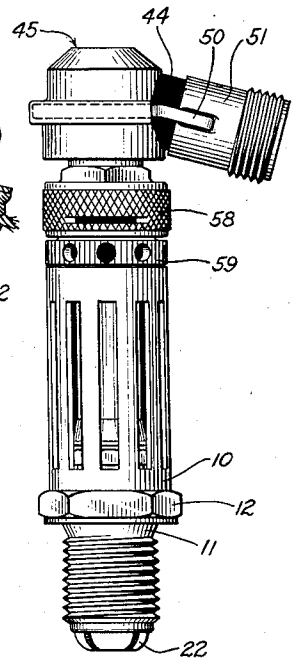
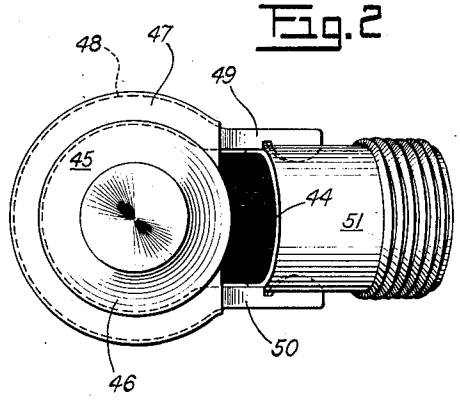


Fig. 2



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UNITED STATES PATENT OFFICE

2,081,503

IGNITION APPARATUS

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Application November 5, 1935, Serial No. 48,416

9 Claims. (Cl. 123—169)

This invention relates to ignition apparatus for internal combustion engines and more particularly to spark plugs.

An object of the invention is to provide an improved spark plug of the self-shielding type, some of the novel features of the construction being a provision of a slotted or otherwise apertured outer casing extending upwardly from the cylinder engaging base and terminating in a coupling member adapted to receive a rotatable shielded head from which the ignition cable extends in a direction transverse to the axis of the plug.

Another object of the invention is to provide novel shielding and attaching means for the spark plug head above referred to, together with novel means for securing within said head both the ignition cable and the terminal connection from said cable to the center electrode of the spark plug.

A further object of the invention is to provide novel insulating means for protecting both the terminal connection and the center electrode, and for protecting said terminal and center electrode from the injurious effect of excessive heating thereof. In this connection the feature of the invention is the heat radiating construction associated with the apertured outer casing above referred to. Other objects and features of the invention will become apparent from inspection of the following specification when read with reference to the accompanying drawing wherein is illustrated the preferred embodiment of the invention. It is to be expressly understood, however, that the drawing is for the purpose of illustration only, and is not designed as a definition of the limits of the invention, reference being had to the appended claims for this purpose.

In the drawing:

Fig. 1 is a longitudinal sectional view of a shielded spark plug embodying the invention;

Fig. 2 is a plan view of the plug shown in Fig. 1; and

Fig. 3 is a view in elevation on a reduced scale.

Referring principally to Fig. 1 the slotted casing 10 is shown as an upward extension of the cylinder engaging base or shell 11, the lower edge of the cylindrical casing 10 being flush with the upper surface of the polygonal portion 12 which receives the wrench or other tool for insertion of the plug in the cylinder wall. This lower portion of the casing 10 is also shown provided with inwardly projecting pins 13 by which the casing 10 is made fast to the shell 11, but it is to be understood that the two members 10 and 11 may be made integral if preferred.

Instead of completely closing the space between the casing 10 and the center electrode spindle 14 I provide a cooling and ventilating chamber in the form of an annular space between the casing 10 and a long thin metallic sleeve 15 having low thermal conductivity and lined with a tube 16 formed of rolled mica constituting the wall of a second annular chamber closed at its lower end by heat resisting disc or washer 17 resting upon the upper surface of a gland nut 18 of brass or other compressible metallic material, having a shoulder adapted to be supported upon shell 11 through the intermediate agency of a sealing gasket 19, below which the reduced end of the gland nut extends to exert pressure upon the insulating body 20 composed of a plurality of compressed mica washers the lower of which rests upon the bowl shaped upper end of the electrode tip 21 which, as shown, extends into position to coact with the grounded electrode 22 secured to the shell 11. Between the mica stock 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 upper mica stack 24 which is impressed against the gland nut 18 by the pressure exerted thereon when the upper hollow end 26 of the spindle is turned downwardly or upset upon the compressible metallic elements 28, 29 and 30 the latter of which press outwardly as well as downwardly to effect a firm hold through the instrumentality of the cooperating metallic ring 31, upon the mica lining 16 of the metallic tube 15.

Within the hollow upper portion of the spindle 14 there is provided a connecting pin 34 having an enlarged central part 35 against which the upper end of coil spring 36 engages to urge the pin constantly against the screw head 41, the lower end of the spring being in contact with the upper surface of a pedestal 37 resting at its lower end against the copper insert 38 of the spindle. The connecting pin 34 may terminate in a rounded head, but is shown as tapered at its upper end for engagement with a tapered recess in the center of a slot in the head 41 of the terminating screw 42, the pointed end of which pierces and thereby securely holds the rubber covered ignition cable 43 which is received within the transverse bore of the insulating member 44 constructed of porcelain or similar moldable material constituting the core of the spark plug head 45 the outer portion of which consists of two major parts:—

First, the cap 46 having a radially extending rim 47 to receive a metallic band 48 which terminates in a pair of resilient arms 49 and 50 having fingers engageable with depressions in the cylindrical surface of sleeve 51 constituting part of the cable shielding hereinafter described.

The second major part of the shielding head consists of a metallic cup 54 having a rim 55 secured within the cooperating rim 47 of the cap 46 and apertured at its base to provide an attaching edge for the neck portion 56 which in

turn is flanged at its base as indicated at 57 for adjustable connection with the coupling nut 58 which is internally threaded for engagement with the attaching bushing 59 which adjustably secures the head and coupling nut 58 to the main casing 10.

Within the element just described and supported upon the upper end of the tube 15 there is a metallic ring 61 serving as a base to support the asbestos disc 62, the metallic washer 63 and the rubber discs 64 adapted to form a water tight joint about the downwardly extending shank 66 of the insulating elbow 44. At its lower end this shank receives an internally threaded metallic insert ring 67 into which the terminating screw 47 is threaded to more firmly locate the said screw and the cable 43 attached thereto. Abutting ring 67 is a coiled spring 68, the lower end of which engages the electrode tip or washer 28, to supplement pin 34 as a current conducting means between screw 42 and electrode 14. If desired, additional protection against moisture may be provided in the form of an asbestos disc interposed between the head portion of the insulating member 44 and the base of the cup 54 as indicated at 69.

As above stated, sleeve 51 constitutes part of the cable shielding, the remaining parts being the wedge ring 71 soldered to or otherwise integrated with the flexible metallic sheath 72, the compressible metallic washer 73, and the coupling nut 74 threadedly engaging sleeve 51. This cable shielding assembly is electrically connected with the shielding cap 46 by means of the fingers 49 and 50 above described. For claims to the unclaimed features disclosed herein, and also disclosed in one or more of my co-pending applications numbered 16,882; 62,524; 121,216; 121,217; and 134,396, filed April 17, 1935, February 5, 1936, January 18, 1937, January 18, 1937, and April 1, 1937, respectively, reference is to be made to said co-pending applications, or divisions thereof.

What is claimed is:

1. A radio shield for spark plugs comprising an outer wall and a cap including a neck portion received within the upper end of said outer wall and a mass of moulded insulation material in said cap adapted to receive an electrical conductor, said insulating material terminating below the lower end of said cap and a heat radiating tube within said outer wall and surrounding the lower end of said mass of insulating material.

2. A radio shield for spark plugs comprising an outer wall and a cap including a neck portion received within the upper end of said outer wall and a mass of moulded insulation material in said cap adapted to receive an electrical conductor, said insulating material terminating below the lower end of said cap and a heat radiating tube within said outer wall and surrounding the lower end of said mass of insulating material, a cable piercing screw located within said insulating mass, a pin connecting said screw with the central electrode of the plug, and additional insulating material occupying a portion of the space between said pin and heat radiating tube.

3. A structure comprising an insulator having a laterally extending arm, a shielded cable terminating in said laterally extending arm, a metallic tube surrounding the lower portion of the insulator, a shielding head having a cap portion above the upper end of the insulator but terminating short of the laterally extending arm, and means projecting from said cap portion to engage the cable shielding and thereby complete the shielding circuit across the otherwise uncovered laterally extending arm.

4. A structure comprising an ignition cable and insulator having a head portion and a laterally extending, partially exposed arm to receive the ignition cable, and a longitudinal extension to project into the outer casing of the plug, a metallic cap covering for the head portion only of said insulator but including current conducting means extending therefrom for engagement with the cable shielding, and a metallic neck covering secured to said head covering and adapted to register with said plug casing, and thereby complete the shielding circuit of the plug and cable.

5. A structure comprising an insulator having intersecting passages therein, a cable terminating in one of said passages, means extending through the other of said passages to engage and hold the cable against displacement, a metallic inner tube surrounding the lower portion of the insulator, a shielding head disposed above said tube, protective means interposed between said head and tube, and a metallic outer casing spaced from said tube, and in current conducting relation to said shielding head.

6. A structure comprising an insulator having a cable terminating therein, a metallic inner tube surrounding the lower portion of the insulator, a shielding head disposed above said tube, protective means interposed between said head and tube, said interposed means including a member fitting tightly about said insulator, and a metallic outer casing spaced from said tube, and in current conducting relation to said shielding head.

7. A radio shield for spark plugs comprising a metallic cap and an insulator extending beyond said cap and adapted to receive an electrical conductor, a shielded cable coupling engaging the extending portion of said insulator but terminating short of said cap, and means acting to complete the electrical shielding between said cap and cable coupling, while leaving a substantial surface area of said insulator exposed.

8. A radio shield for spark plugs comprising a cap having upper and lower sections and a mass of insulation material extending beyond said cap and adapted to receive an electrical conductor, a shielded cable coupling engaging the extending portion of said insulating mass, and means acting to complete the electrical shielding between said cap and cable coupling, said means being secured between the upper and lower sections of said cap, and adapted to cover only a minor portion of the exposed surface of said insulating mass.

9. A radio shield for spark plugs comprising a cap, a mass of insulation material adapted to receive an electrical conductor, means establishing electrical connection between the electrical conductor and the central electrode of the spark plug, said insulation material having one end terminating below said cap and its other end extending beyond said cap in a lateral direction, and a shielded cable coupling engaging the laterally extending portion of said insulating mass, but terminating short of said cap to leave a substantial portion of the insulating surface exposed.

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