

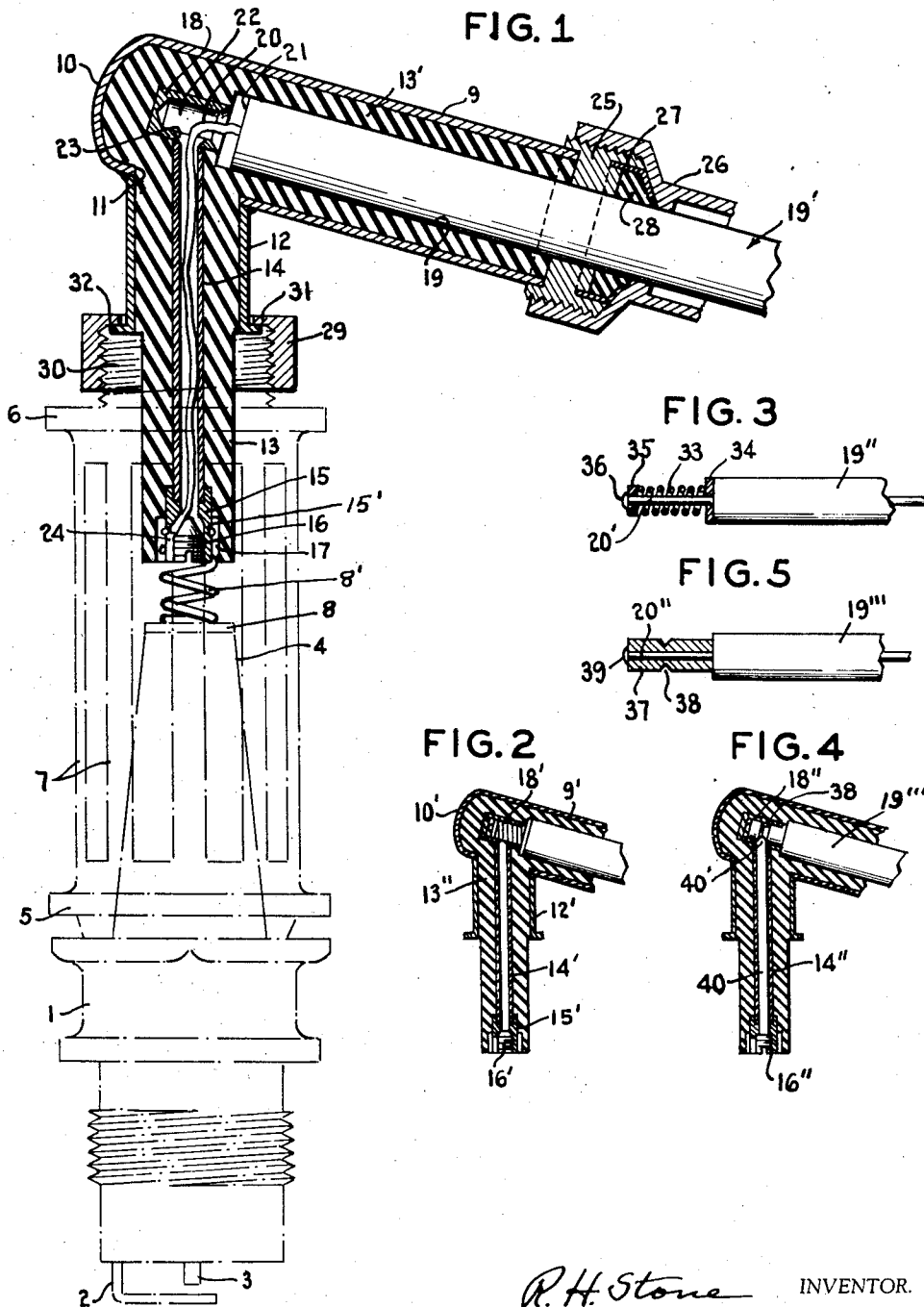
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RADIO SHIELDING SPARK PLUG CONNECTION

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RADIO SHIELDING SPARK PLUG CONNECTION

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This invention relates to the connection of ignition wires to the spark plugs of internal combustion engines in such manner that a shield is provided to prevent interference with the operation of neighboring radio apparatus by ignition current passing through the connection. The shielding means of the connection may cooperate with other shielding means upon other portions of the ignition system so that the whole ignition system is shielded from interfering with neighboring radio apparatus.

Especially is this shielding necessary on aeroplanes where the engine and radio are necessarily closely associated and the use of the radio is made extremely difficult if not impossible by the interference occasioned by the operation of the ignition system of the engine unless shielding from the ignition is provided.

The main object of the invention is to provide a spark plug connection which shall have the shielding properties as referred to and also the other essential characteristics required of a spark plug connection.

A further object of the invention is to provide a spark plug connection of the character as indicated which shall be capable of simple and inexpensive manufacturing.

A further object of the invention is to provide a structure of the character as indicated wherein the insertion and removal of the ignition wire may be readily accomplished.

A further object of the invention is to provide a device of the character as described wherein the transmission of heat from the engine along the connection is retarded to prevent injury to the ignition connections by heat as transmitted.

Other and ancillary objects of the invention will appear hereinafter.

In the accompanying drawing which illustrates the invention—

Fig. 1 is a central longitudinal section of a device embodying the invention;

Fig. 2 is a similar view of a modified construction on a reduced scale;

Fig. 3 is a side elevation, on an enlarged scale, of an end of an ignition conductor adapted for use in the construction of Fig. 2;

Fig. 4 is a view similar to Figs. 1 and 2 of a modified construction; and

Fig. 5 is a side elevation, on an enlarged scale, of an end of an ignition conductor adapted for use in the construction of Fig. 4.

Referring to the drawing, and first to Fig. 1, the spark plug comprises the usual threaded outer metal casing 1 which is screwed into the engine

block in the well-known manner and has soldered or otherwise metallically secured to it the usual sparking electrode 2. The other and central sparking electrode 3 is insulated in the usual manner by being carried in a porcelain plug 4 which is clamped in the casing 1 but instead of being so clamped by the usual hollow nut a hollow metal casing consisting of the end portions 5 and 6, between which extend the strips 7, has its lower end portion 5 screw-threaded into the casing 1 and serves to clamp the porcelain plug in place. The central electrode 3 extends above the top of the porcelain where it is provided with a flat contact 8. It will be seen that the spark plug as described is of the standard and well-known type except for the modified form of nut by which the porcelain carrying the central electrode is clamped in position and the contact at the top of the central electrode.

To the top portion 6 is secured a structure comprising the metal casing including the cylindrical portion 9 of copper, this copper portion having one end 10 closed and the other end open. The cylindrical portion 9 has a lateral opening 11 with which registers a cylindrical metal portion 12 of stainless steel, in chrome or other metal of relatively low heat conducting properties. This retards the transmission of heat from the engine back along the ignition lead while the copper portion 9, being a good dissipator or radiator of heat, acts with regard to any heat which does reach it to reduce the heat transmitted along the ignition conductor. The portions 9 and 10 are secured together with their axes at an angle, and in electrical conducting relation in any suitable manner as by brazing.

The ignition connection requires to be well insulated and accordingly a body of suitable electrical insulating material 13 such as bakelite, a well-known phenolic condensation product, is molded within the metal casing and with a projection 13 extending below the metal portion 12 and fitting within the end portion 6. The insulation is molded about a metal tube 14 located centrally of the portion 12, such tube being of stainless steel or other metal of relatively low heat conducting properties for reasons as above referred to. To the lower end of the tube 14 is secured by brazing or in other suitable ways, a larger metal tube 15 within which is a set screw 16 and a clearance 17 is provided about the tube 15 and the surrounding walls of the molded insulation of the projection 13. To the top of the tube 14 is secured by brazing or in any other suitable way, a metal block 18 of square cross section

having the bore 22. The tubes 14 and 15 and block 18, secured together are placed in position in the metal casing and the insulation molded about them. The clearance 17 is then formed. The relatively large recess 19 for the reception of the insulation wire 19' of usual construction consisting of the copper conductor 20 covered with insulation 21, is cored out by a core occupying the space during the molding, such core preventing the molten insulation from entering the bore 22. Also the metal block 18 has a lateral hole 23 registering with the tube 14 and opening into the bore 22. The conductor 20 from which the insulation is removed passes through the recess 22, the hole 23 and the tube 14 and thence into a slot 24 in the sleeve 15. The conductor 20 is secured by means of a set screw 16 screw-threaded in the tube 15 and clamping the conductor against the tube 15.

To establish electrical connection from the conductor 20 to the central spark plug electrode 3 a metal spring coil 8' of phosphor bronze or other suitable material, has its upper coil sprung into the groove 15' in the sleeve while its lower end is spring pressed against the contact 8.

It will be observed that the metal casing including the members 9 and 12 are grounded through the head 5 and casing 1, such grounding being desirable to the radio shielding qualities of this metal casing.

To secure the shielding casing 9 to a shielding portion extending back over the ignition wire 19' toward the magneto, an exteriorly threaded metal block 25 is secured to the end of the metal casing portion 9 in any suitable way as by brazing, the insulated ignition conductor 19' passing therethrough. A hollow nut 26 to which the shielding casing toward the magneto is secured is screw-threaded upon the block 25 and when screwed up bears against the hollow cone-shaped metal member 27 secured in a groove in the block 25 by brazing or in any other suitable way, thereby electrically connecting the shielding casing 9 with the shielding casing closer to the magneto. This electrical connection is not, however, absolutely necessary in the present case as the casing for the connection including the parts 9 and 12 are otherwise grounded through the spark plug as before referred to.

Within the cone-shaped portion 27 is a rubber ring or washer 28 which is forced downwardly against the insulated conductor 19' as it is compressed by the screwing home of the nut 26, thereby forming a fluid-tight joint which prevents any moisture from entering the spark plug connection and also frictionally grips the insulated conductor 19' to hold it against withdrawal.

The molded insulation with its metal casing is secured in operative relation to the spark plug by means of a hollow metal nut 29 screw-threaded upon a boss 30 upon the head 6 and having an in-turned flange 31 overlapping a flange 32 upon the lower end of the casing part 12. When the nut 29 is screwed home the flange 32 will be clamped firmly against the boss 30 thereby establishing a firm and stable mechanical connection.

It will be observed that when desired the set screw 16 may be released, and the wire readily withdrawn through the tube 14. This is an important feature in connection with the placing or renewal of ignition wires which are especially liable to damage in connection with aeroplane engines and may require frequent renewal. If

the bakelite insulation were molded directly about the conductor 20 it would be practically impossible to remove it to renew the ignition lead. Where it is attempted to form a hole through the molded bakelite by using a core in the molded portion, which core is to be subsequently withdrawn, it has been found to be extremely difficult if not impossible to remove the relatively long thin core. With the use of the tube 14, with the insulation molded about it, however, the difficulties as referred to are avoided, the tube is held firmly in position and provides a passage through which the ignition conductor may be readily inserted or withdrawn at will.

It will further be observed that the ignition conductor is amply insulated and that the exterior grounded metal casing provides a radio shielding of the connection as referred to.

Referring to Figs. 2 and 3 there is therein shown a modified construction which is similar to that of Fig. 1 except that the tube and its connected metal block which form a passage way for the ignition conductor in Fig. 1, are, according to the construction of Figs. 2 and 3, themselves relied upon to form the electrical connection. Thus in the construction of Figs. 2 and 3 the metal casing consisting of the parts 9', 10' and 12', has the insulation 13'' molded within it about the tube 14' and the metal block 18', the lower end of the tube 14' being secured to a larger tube 15' having screw-threaded in it a screw plug 16', there is inserted in the recess in the block 18' an end 20' of the copper wire of the insulated conductor 19'', about which is helically coiled a compression spring 33, one end of the spring bearing against the washer 34 which bears against the insulation of the wire, and the other end of the spring bearing against the washer 35 through which the conductor 20' passes and is headed or peened-over at 26. If desired this conductor may be brazed to the washer 35. When the spring and conductor are inserted tightly in the recess in the metal block 18', the conductor 20', which is ordinarily somewhat flexible, will buckle or give on being inserted, so that the spring 33 will maintain good connection with the plug 16' at all times. The device of Fig. 2 is secured to the spark plug by clamping thereto in the manner as described in connection with Fig. 1, and connection will be established from the ignition conductor 20' through the metal block 18', metal tubes 14' and 15' to the spark plug electrode by a spring similar to 8' of Fig. 1.

Referring to Figs. 4 and 5, the construction is similar to that of Fig. 1 except for the manner of connecting the ignition wire conductor with the spark plug electrode. To accomplish this result the metal conductor 20'' of the insulated conductor 19''' is bared of insulation and telescoped thereon is a cylindrical block of metal 37 having a circumferential groove 38, this block being secured upon the conductor by peening-over or heading the conductor 20'' at 39. The connection may be still further enhanced by brazing.

In establishing the electrical connection, the wire 20'' and its carried metal block 37 are inserted within the recess of the metal block 18'', and the screw plug 16'' carrying a long needle-like member 40 extending through the tube 14'' and having a pointed end 40', is screwed up. The pointed end enters within the groove 38 and securely holds the ignition conductor in position and establishes electrical contact therewith through the block 37. Electrical connection be-

tween the block and the end of the central electrode conductor, is established by a spring in the manner as set forth in connection with Fig. 1.

Instead of removing the insulation and providing a grooved cylindrical block 37 as provided in Figs. 4 and 5, the wire with its insulation on it might be continued into the recess in the metal block 18" and connection be established with the conductor by causing the needle point of the member 40 to puncture the insulation and make contact with the conductor as the plug 16" is screwed up.

While the invention has been illustrated in what are considered its best application it may have other embodiments without departing from its spirit and is not therefore limited to the structures shown in the drawing.

What I claim is:

1. A spark plug connection comprising in combination a metal casing, insulation molded therein, electrical conductors for providing ignition connections with a spark plug extending through said insulation and means for electrically connecting said conductors with the electrode of a spark plug, said connection being adapted to receive an ignition conductor and having a metal tube about which the insulation is molded.

2. A spark plug connection comprising in combination a metal casing, insulation molded therein, electrical conductors for providing ignition connections with a spark plug extending through said insulation and means for electrically connecting said conductors with the electrode of a spark plug, said connection being adapted to receive an ignition conductor and having a metal tube about which the insulation is molded and through which the electrical connection with the spark plug is made.

3. A spark plug connection comprising in combination a metal casing, insulation molded therein, electrical conductors for providing ignition connections with a spark plug extending through said insulation and means for electrically connecting said conductors with the electrode of a spark plug, said connection comprising members at an angle with each other, one of said members adapted to receive an ignition conductor and the other of said members having a tube about which insulation is molded.

4. A spark plug connection comprising in combination a metal casing, insulation molded therein, electrical conductors for providing ignition connections with a spark plug extending through said insulation and means for electrically connecting said conductors with the electrode of a spark plug, said connection comprising members at an angle with each other, one of said members adapted to receive an ignition conductor and the other of said members having a tube about which insulation is molded, said ignition conductor passing through said tube.

5. A spark plug connection comprising in combination a metal casing, insulation molded therein, electrical conductors for providing ignition connections with a spark plug extending through said insulation and means for electrically connecting said conductors with the electrode of a spark plug, said connection comprising members at an angle with each other, one of said members adapted to receive an ignition conductor and the other of said members having a tube about which insulation is molded, said ignition conductor passing through said tube and means for clamping said conductor to said tube.

6. A spark plug connection comprising in com-

bination a metal casing, insulation molded therein, electrical conductors for providing ignition connections with a spark plug extending through said insulation and means for electrically connecting said conductors with the electrode of a spark plug, said connection being adapted to receive an ignition conductor and having a metal tube about which the insulation is molded and a member movable longitudinally of said tube for establishing connection with said ignition conductor.

7. A spark plug connection comprising in combination a metal casing, insulation molded therein, electrical conductors for providing ignition connections with a spark plug extending through said insulation and means for electrically connecting said conductors with the electrode of a spark plug, said connection comprising members at an angle with each other, one of said members adapted to receive an ignition conductor and the other of said members having a tube about which insulation is molded and a member movable longitudinally of said tube for establishing connection with said ignition conductor.

8. A spark plug connection comprising in combination a metal casing, insulation molded therein, electrical conductors for providing ignition connections with a spark plug extending through said insulation and means for electrically connecting said conductors with the electrode of a spark plug, said connection being adapted to receive an ignition conductor and having a metal tube about which the insulation is molded, a screw plug engaging with said tube and a member mounted thereon and movable longitudinally of said tube for establishing connection with said ignition conductor.

9. A spark plug connection comprising in combination a metal casing, insulation molded therein, electrical conductors for providing ignition connections with a spark plug extending through said insulation and means for electrically connecting said conductors with the electrode of a spark plug, said connection comprising members at an angle with each other, one of said members adapted to receive an ignition conductor and the other of said members having a tube about which insulation is molded, a screw plug engaging with said tube and a member mounted thereon and movable longitudinally of said tube for establishing connection with said ignition conductor.

10. A spark plug connection elbow comprising in combination a metal casing, molded insulation therein, said elbow comprising members at an angle with each other, an insulation covered conductor, said conductor extending continuously through both of said members, both conductor and insulating cover entering within said molded insulation in one of said members and extending outside the elbow, and having the insulating cover removed from that portion of the conductor within the other member, the last mentioned member having an opening in molded insulation in which the conductor loosely fits whereby it may be readily inserted in and withdrawn from said opening.

11. A spark plug connection elbow comprising in combination a metal casing, molded insulation therein, said elbow comprising members at an angle with each other and a conductor extending continuously through both of said members and said molded insulation, each of said members having openings in said molded insulation in which said conductor freely lies whereby

it may be readily withdrawn from or inserted in said elbow.

12. A spark plug connection elbow comprising in combination a metal casing, molded insulation therein, said elbow comprising members at an angle with each other and a conductor extending continuously through both of said members and said molded insulation, each of said members having an opening in said molded insulation in which said conductor freely lies whereby it may be readily withdrawn from or inserted in said elbow and a terminal on said elbow to which the end of said conductor is connected.

13. A spark plug connection elbow comprising in combination a metal casing, molded insulation therein, said elbow comprising members at an angle with each other and a conductor extending continuously through both of said members and said molded insulation, each of said members having an opening in said molded insulation in which said conductor freely lies whereby it may be readily withdrawn from or inserted in said elbow and a terminal on said elbow to which the end of said conductor is connected and means for clamping said conductor to said terminal.

14. A spark plug connection elbow comprising in combination a metal casing, molded insulation therein, said elbow comprising members at an angle with each other, an insulation covered conductor, said conductor extending continuously through both of said members, both conductor and insulating cover entering within said molded insulation in one of said members and extending outside the elbow, and having the insulating cover removed from that portion of the conductor within the other member, the last mentioned member having an opening surrounded by the molded in-

sulation in which the conductor loosely fits whereby it may be readily inserted in and withdrawn from said opening, a terminal on said elbow to which the end of said conductor is connected and means for clamping said conductor to said terminal.

15. A spark plug connection elbow comprising in combination a metal casing, molded insulation therein, said elbow comprising members at an angle with each other, electrical conductors for providing ignition connections with a spark plug extending through said insulation and means for electrically connecting said conductors with the electrode of a spark plug, one of said members of said elbow being adapted to receive an ignition conductor and the other of said members having an opening surrounded by the molded insulation, a conductor electrically connected to the conductor in the other member of said elbow freely passing through said opening whereby it may be moved along said opening to withdraw it from or insert it in said opening.

16. A spark plug connection elbow comprising in combination a metal casing, molded insulation therein, said elbow comprising members at an angle with each other, electrical conductors for providing ignition connections with a spark plug extending through said insulation and means for electrically connecting said conductors with the electrode of a spark plug, one of the members of said elbow being adapted to receive an ignition conductor and the other of said members having an opening surrounded by the insulation, a member located within and movable longitudinally of said opening for establishing connection with the conductor in the other elbow member.

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