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R. H. STONE

2,143,231

IGNITION LEAD

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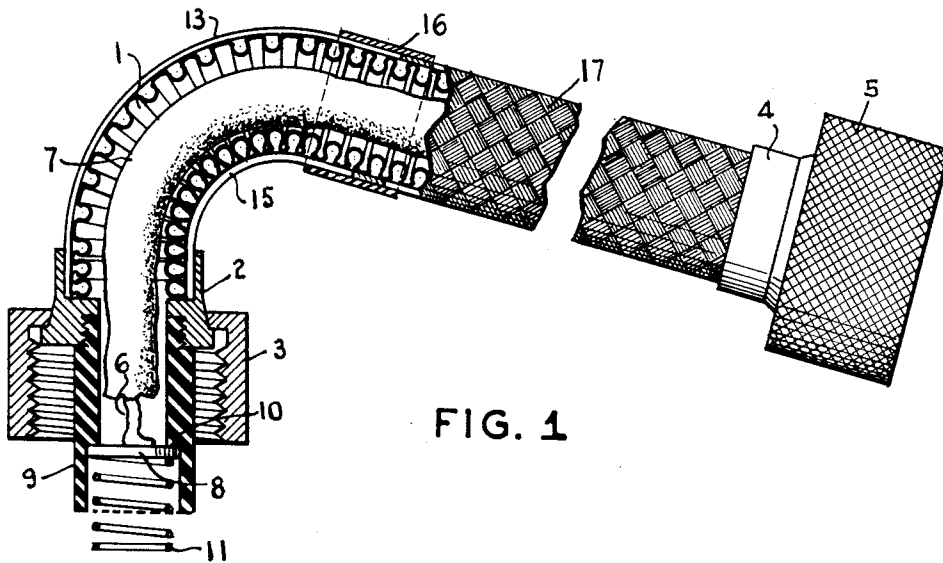


FIG. 1

FIG. 2

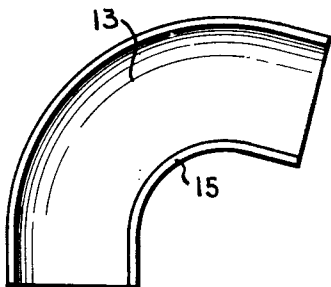


FIG. 3

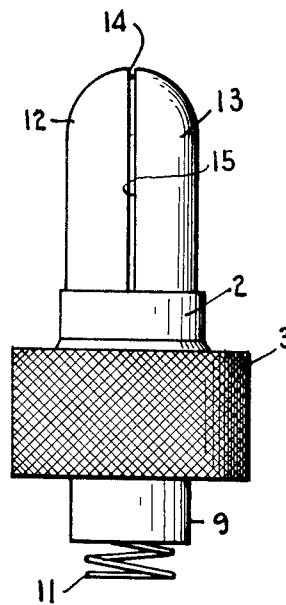
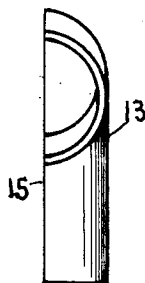


FIG. 4

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## UNITED STATES PATENT OFFICE

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## IGNITION LEAD

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2 Claims. (Cl. 247—5)

This invention relates to improvements in radio shielded electric conductors especially such shielded ignition leads to the spark plugs of internal combustion engines.

5 As is well known, the variable current of the ignition circuits of internal combustion engines produces such a disturbance in adjacent radio receivers that the radio reception is greatly impaired, if not destroyed. Particularly is this true in aeroplanes where the engine and radio receiver are necessarily relatively close together. Various means have been proposed for shielding the ignition conductors to prevent such interference with radio reception.

15 The main object of the present invention is to provide improved means for radio shielding ignition conductors of internal combustion engines which shall be simple in construction and efficient in operation.

20 A further object of the invention is to provide a radio shield for an ignition conductor, which shield shall comprise a continuous flexible conduit enclosing the conductor proceeding in an angular path, the conduit being flexed to accommodate the angular path of the conductor and means being provided to hold the conduit in the desired degree or condition of flexure.

25 A further object of the invention is to provide the usual bend or elbow adjacent the spark plug by flexing the flexible conduit and providing means for holding the conduit in the condition of flexure desired for the elbow.

30 A further object of the invention is to provide the elbow or bend in a radio shielded conductor comprising a flexible conduit about the conductor having a bend which is held in the desired degree or condition of bending by means of a relatively stiff casing applied to the exterior of the flexible conduit, which casing comprises arc-shaped sections divided longitudinally of the conduit and of a curvature corresponding to the elbow or bend desired.

35 Other and ancillary objects of the invention will appear hereinafter.

In the accompanying drawing which illustrates the invention—

Fig. 1 is a side elevation, partly broken away and partly in section, of an ignition lead embodying the invention;

Fig. 2 is a side elevation of one of the segments of the stiff casing for fixing the elbow in the lead of Fig. 1;

Fig. 3 is an end view of the segment of Fig. 2; and

Fig. 4 is an end view, viewed from the left of the lead shown in Fig. 1.

Referring to the drawing, the lead comprises a flexible corrugated metal tube 1 which may be formed by helically disposing a metal strip having a longitudinal groove and having the edges of adjacent convolutions of the strip interfolded, such tube being shown and described in Patent No. 1,198,392, L. H. Brinkman, patented September 12, 1916, particularly with reference to Figs. 1 to 7 inclusive of the patent.

At the spark plug end of the lead the flexible tube 1 enters the coupling member 2 upon which is mounted the swivel nut 3 which may be screwed upon a spark plug or a housing therefor to secure the lead in operative relation to the spark plug. Secured in the member 2 is an insulating sleeve 9 which may be of Bakelite molded to the member 2. The other end of the tube enters within a coupling member 4 similar to the member 2, the tube 1 being continuous between the members 2 and 4, upon which is mounted a swivel nut 5 similar to the nut 3, which provides a means for securing the lead to a magneto housing, a manifold or other structure from whence the ignition lead comes.

Within the tube 1 is the insulated ignition lead conducting ignition current from a suitable source of supply such as a magneto, which may be an insulated conductor of more or less flexibility such as the copper conductor 6 encased in insulation 7. The electrical conductor 6 is soldered to the metal plate 8 within the sleeve 9 and bearing against the shoulder 10 on the sleeve.

Also secured to the plate 8 in electrical conducting relation is the coiled metal spring 11, the lower end of the spring being adapted to bear upon the top terminal of the usual spark plug when the lead is secured in position by the nut 3.

It will be observed that adjacent the spark plug end of the lead there is a bend or elbow. It has usually been found expedient to provide a bend or elbow in the ignition lead adjacent the spark plug.

To provide the elbow according to the present invention the flexible corrugated tube is bent to the desired degree, and to the outside of the tube are applied, upon opposite sides thereof, longitudinally curved stiff sections 12 and 13 of arc-shaped cross section, each of such stiff sections being as shown in Fig. 2 and Fig. 3, which substantially fit the exterior contour of the tube 1 and are of such curvature as it is desired that the lead structure shall have. The sections 12 and 13 are

of such circumferential extent, however, that gaps or slots 14 and 15 exist between them upon opposite sides of the lead structure.

The ends of the sections 12 and 13, together with the end of the tube 1, are entered within the coupling member 2 and suitably secured therein as by soldering. The other ends of the sections 12 and 13 are secured in position upon the tube 1 by means of a metal band 16 encircling the tube within which the ends of the sections are entered and secured by soldering.

The portion of the tube 1 between the band 16 and the coupling member 4 may be covered with a metal braid 17 consisting of braided or interwoven metal strips forming a woven sleeve about the tube 1, the ends of the strips or strands forming this woven sleeve, as well as the tube 1, being secured within the coupling member 4 by suitable means such as soldering, and the other end of the braided tubular structure 17 entering and being secured within the metal band 16 by suitable means, such as soldering, the band 16, tube 1, braid 17 and sections 12 and 13 being soldered together.

This provides a simple and efficient radio shield for the ignition conductor, it being observed that the slots 14 and 15 extend longitudinally of the conductor so that the radio shielding is not substantially impaired, the application of the sections 12 and 13 to the tube 1 being thus facilitated and the heat conduction from the engine along the conduit being retarded which is a most desirable condition. To facilitate the heat re-

tardation the sections 12 and 13 may be formed of metal of low heat conductivity such as stainless steel.

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

What I claim is:

1. The combination with a flexible conduit, of an electric conductor therein, said conduit having a bend flexed therein and means for holding said bend substantially fixed, said means comprising a plurality of relatively stiff sections extending longitudinally of said conduit and having between them slots extending longitudinally of said conduit, said sections being of arc-shaped cross section, said means being supported at at least one end by said conduit.

2. The combination with a corrugated flexible conduit, of a terminal receiving one end of said conduit, said conduit having a bend flexed in it, means for holding said bend substantially fixed, said means comprising a plurality of relatively stiff sections of arc-shaped cross section extending longitudinally of said conduit and being received in said terminal, and a band at a distance from said terminal surrounding said conduit and said sections and holding said sections in place upon said conduit and a cover for said conduit outside said sections, said cover having an end extending beneath said band.

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