

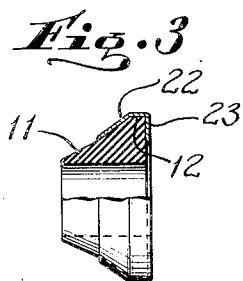
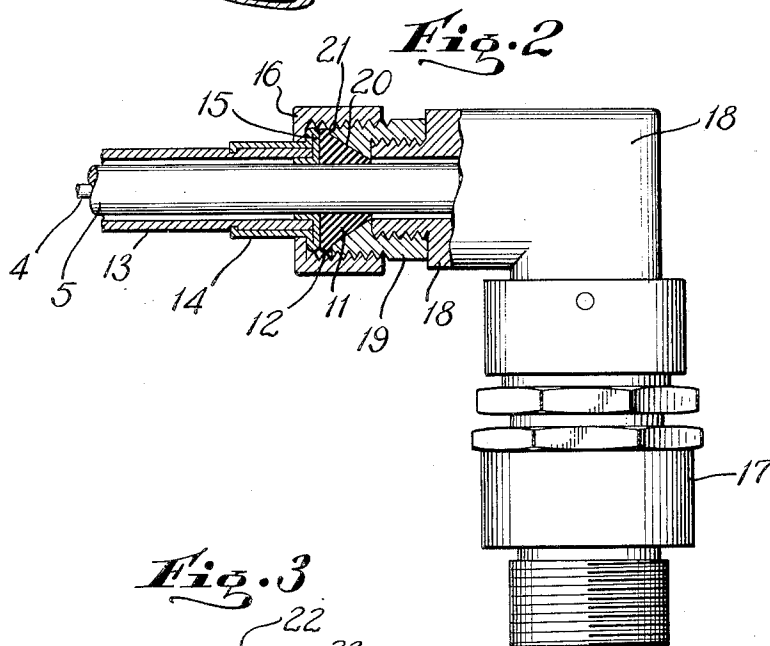
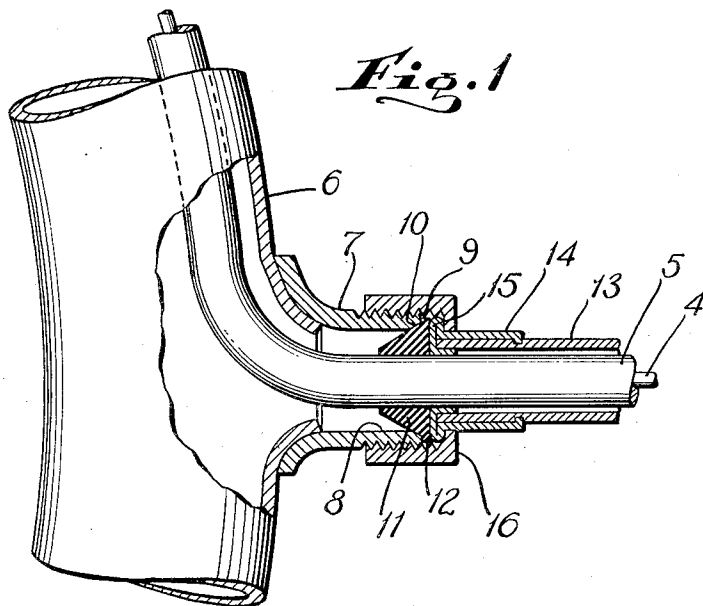
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LIQUIDPROOF ELECTRICAL JOINT

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LIQUIDPROOF ELECTRICAL JOINT

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2 Claims. (Cl. 247-5)

This invention relates to a liquidproof electrical joint.

The subject matter hereof is a continuation in part of application Serial No. 550,076, filed July 11, 1931, and a continuation in part of application Serial No. 394,618, filed September 23, 1929.

In radio shielding of the ignition systems of internal combustion engines it is desirable to use sectional shields. The main objects of shielding are to provide a continuous metallic housing around the ignition wires to absorb and ground any improper electrical emanations from the ignition system and to protect the system from water, oil or other deleterious agents. Where sectional shields are used it is essential that the joints between sections be liquidproof and that the joints provide a good electrical connection between sections. Therefore, the broad object of the invention is to provide an electrical and liquidproof joint between sections of a radio shield.

A further object of the invention is to provide such a connection between a section of a shield and a terminal member to which it may be connected, such as, for example, a shielded spark plug.

Where an ignition conductor passes through an outlet it is desirable that the conductor be held to the center of the outlet to prevent abrasion of the insulation caused by rubbing against the sides of the outlet due to vibration or movement of the conductor. Therefore, a further, specific object of the invention is to provide a packing which will hold a conductor securely in the center of an outlet.

Shielding is extensively used on aircraft engines where extreme vibration is encountered. Therefore, a further, specific object of the invention is to provide a packing which will act as a lock to prevent loosening of the connection through vibration.

The invention consists of the construction, combination and arrangement of parts, as herein illustrated, described and claimed.

In the accompanying drawing, forming part hereof, is illustrated one form of embodiment of the invention, in which drawing similar reference characters designate corresponding parts, and in which:

Figure 1 is a longitudinal section, partly in plan, showing the connection between a section of shield to enclose a single wire and a manifold to enclose a plurality of wires;

Figure 2 is a longitudinal section, partly in plan, showing the connection between a section of shield and a shielded spark plug; and,

Figure 3 is an enlarged plan view, partly in section, showing a modified form of packing.

Referring to the drawing, 4 designates an ignition conductor provided with insulation 5. The conductor 4 may be of one piece or of strand wire, and together with the insulation 5, may be referred to generally as an ignition cable. 6 designates a section of a metal manifold to enclose a plurality of ignition cables. The manifold 6 may be of any desired form or contour to suit the needs of a particular engine. Wherever it is desirable to pass a cable from the manifold 6 an outlet 7 is provided. The outlet 7 is formed with a screw threaded neck 8 and a circular end wall 9 at right angles to the axis of the outlet 7. The inner face of the neck 8 is beveled as shown at 10 to receive a packing 11.

The packing 11 may be made of rubber or other suitable composition. The packing 11 is substantially the shape of a truncated cone but adjacent the base thereof is provided with a short cylindrical portion 12. The packing 11 is disposed around the insulation 5 of the conductor 4 and is entered in the neck 8 of the outlet 7. The inclined face of the packing 11 abuts the beveled portion 10 of the neck 8.

Adjacent the base of the packing 11 is a second section of shield 13. The section 13 may be a flexible conduit formed of a flexible metal tube having protective coverings on the outside thereof. The end of the section 13 is provided with a ferrule 14 which is bent upon itself to provide a flange 15 adjacent the base of the packing 11. A coupling nut 16 is carried by the conduit 13 and is adapted to engage the screw threaded neck 8.

When the nut 16 is tightened on the neck 8 the flange 15 is forced against the base of the packing 11. The pressure of the flange 15 forces the inclined face of the packing 11 against the bevel 10 and makes a fluid tight seal. At the same time the resistance of the bevel 10 constricts the packing 11 radially, causing the packing 11 to firmly grip the insulation 5 of the conductor 4. This holds the cable firmly in position and prevents axial movement of the cable in the outlet 7. The pressure of the packing 11 being evenly distributed around the cable, the cable is held firmly to the center of the outlet 7, so that rubbing or abrasion of the cable against the outlet 7 or the edge of the opening in the manifold 6 is prevented. The nut 16 makes an electrical connection between the neck 8 and the flange 15.

When the packing 11 is forced into the outlet 7, the portion of the packing 11 adjacent the

wall 12 is compressed between the flange 15 and the end wall 9 of the neck 8. When the packing 11 is thus compressed the resiliency of the packing 11 holds the coupling nut 15 firmly in position by acting as a locking means. This is most important in aviation where constant vibration is encountered, and this construction obviates the necessity of a lock nut or other locking means to prevent the loosening of the nut 15 through vibration.

Referring to Figure 2, 17 designates a conventional type of spark plug, the upper end of which is provided with a dielectric elbow 18. The elbow 18 is provided with an outlet to receive the spark plug cable and said outlet is provided with a threaded metal connector 19. The connector 19 may be threaded onto the elbow 18 as shown, or it may be molded into the elbow 18, or the separate connector 19 may be eliminated and the end of the elbow 18 provided with screw threads to receive the nut 15. The elbow 18 is shielded by providing a metallic covering therefor, which is electrically connected to the spark plug 17 and to the connector 19 or directly to the nut 15.

The connector 19 is provided with a tapered bore 20 and is formed with a circular end wall 21 at right angles to the axis of the connector 19 in like manner as the wall 9 of the outlet 7. The application of the packing 11 to the connector 19 is the same as that described in relation to Figure 1. It will be obvious that the packing 11 and its associated parts may be applied to various types of shielded spark plugs or spark plug shields.

In the modified form of packing shown in Figure 3, the packing 11 is the same as heretofore described, but is provided with a metal thimble or jacket 22.

The jacket 22 is formed with a base flange 23 to partially cover the base of the packing 11, and the jacket 22 only partially covers the inclined face of the packing 11. The jacket 22 may be made of any desirable metal, preferably copper, and is made relatively thin so as to be slightly yieldable. The jacket 22 reinforces the packing 11 and at the same time makes a direct electrical contact between the sections of the shield.

It is essential that a good electrical connection be made between the sections of the shield so that any electrical emanations absorbed by the shield may be promptly and properly grounded.

The base flange 23 of the jacket 22 will contact the flange 15, and the portion of the jacket 22 lying against the inclined wall of the packing 11 will contact either the wall 10 or the bore 20, as the case may be. By reason of this, it is not necessary to entirely cover the packing 11 with the jacket 22.

It may be pointed out that the cylindrical wall 12 of the packing 11 may be eliminated and the packing 11 made in the form of a true truncated cone. Such a form will give good results but better results are attained by providing the wall 12 so as to provide more material to compress between the flange 15 and the end walls 10 or 21.

Having thus fully described the invention, what is claimed as new, and desired to be secured by Letters Patent is:

1. As a new article of manufacture, a packing adapted to form part of a liquidproof and electrical joint between separable members, said packing being formed of yieldable material and having the shape of a truncated cone having an opening therethrough, said cone having a cylindrical portion adjacent the base thereof and a metal jacket around the base, the portion of the packing adjacent the apex being adapted to be radially constricted and the metal jacket being adapted to increase the electrical path between the separable members.

2. In combination with a radio shielded spark plug, an insulated conductor therefor and a radio shielding conduit around the conductor, a packing between the shielding elements comprising a conical member surrounding the conductor, the outer surface of the cone bearing against an inclined surface on one shielding element to radially constrict the packing, and a metal covering around the base of the cone in contact with both shielding elements to increase the electrical path therebetween.

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