July 18, 1950 J. W. SANGER-STEVENS 2,515,899

ELECTRICAL BONDING COUPLING

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Fig. 1.

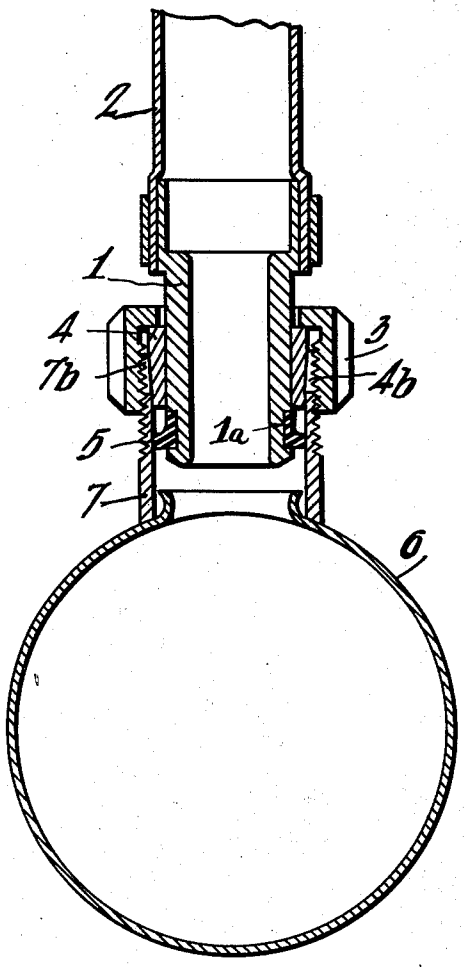


Fig. 2.

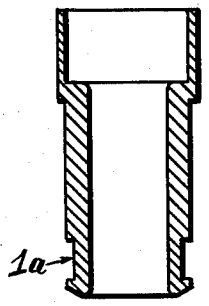


Fig. 3.

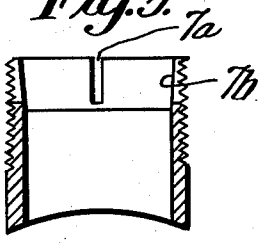
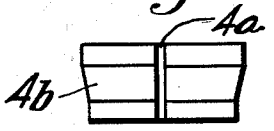


Fig. 4.



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Fig. 5.

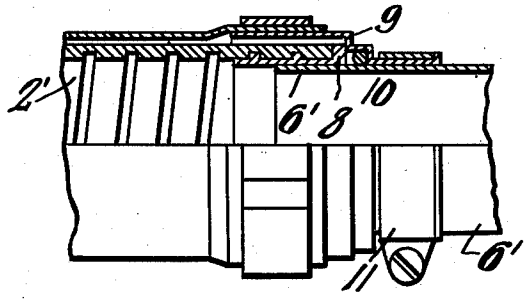


Fig. 6.

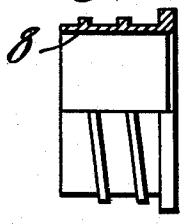


Fig. 7.

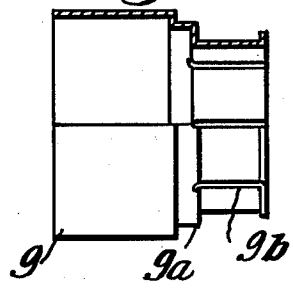


Fig. 8.

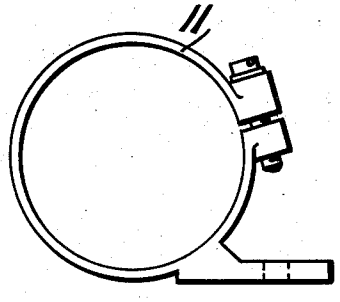
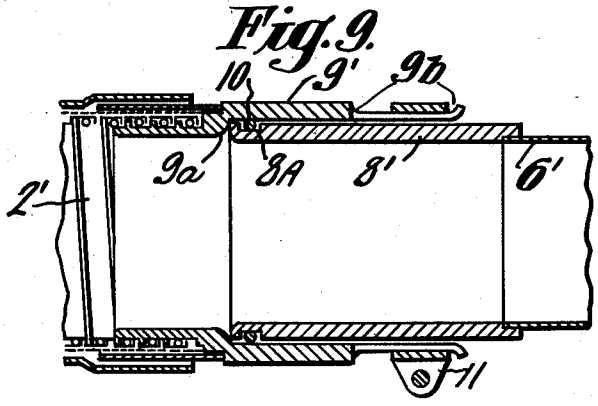


Fig. 9.



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UNITED STATES PATENT OFFICE

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ELECTRICAL BONDING COUPLING

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Application May 1, 1947, Serial No. 745,296
In Great Britain March 27, 1946

2 Claims. (Cl. 285—162)

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This invention relates to electrical bonding couplings and more particularly to bonding couplings for use in so-called "screening harnesses" for internal combustion engine ignition systems and the like for bonding the normally provided flexible screening tubes to the appropriate normally provided fixed tube or tubes.

As is well known, it is usual to provide the ignition systems of aircraft engines with an earthed screening harness whose purpose is to prevent radiation from the ignition system and consequent interference with nearby radio apparatus. Such a screening harness usually comprises a fixed metal tube or tubes connected by flexible metal tubes (often braided) to the magnet or magnetos and to the sparking plugs. The ignition cables are contained within this system so that no part of the cables is left uncovered. Such harnesses are of use in engine ignition systems generally, and are not confined to the application to magneto systems. It is very important that the screening shall be as complete as possible, and that the different parts of the harness shall be well bonded together without the risk of coming undone under the effects of vibration; and in our British Patent Specification No. 511,448 we describe a form of self-locking, readily detachable and simple coupling means which is electrically of high efficiency for bonding the parts of engine ignition harnesses together.

Experience has, however, shown that failure can occur (and upon occasion does occur) for a reason which has not hitherto been appreciated. Hitherto it has been assumed that the flexibility of the flexible tubes in a screening harness is sufficient to take up for any irregularities of length, distance, and spacing in and between the different parts of a harness bonded together by the couplings. However, in practice this is not always so, for the compressibility of the tubes and other parts of the harness is limited and manufacturing errors, accumulated tolerances, and the like may be (and sometimes are) such as either to prevent the parts of the harness from being properly positioned as desired, or such as to involve such strains on some part or parts as to involve failure, especially after considerable periods of vibration.

The present invention seeks to overcome this defect and to provide a coupling which shall allow a degree of telescopic adjustment, so that the desired lay or run of the parts of a harness may be obtained when fitting it; the couplings being then telescopically adjusted (before being

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locked) to positions in which the parts of the harness are not adversely strained. In effect, as will be seen later, the invention in one embodiment provides a coupling which is generally like that described in our copending British Patent Specification No. 511,448, but which permits of telescopic adjustment and is capable of being made substantially airtight.

According to this invention, one part of an internal combustion engine ignition screening harness or the like is bonded to another by a bonding coupling comprising a tubular member which is carried by one part and is dimensioned and shaped to permit of telescopic movement with reference to the other, said member being split longitudinally so as to render it deformable radially, with means being provided for producing such radial deformation whereby said member may be firmly gripped in any desired position in its range of telescopic adjustment.

In one way of carrying out the invention, a bonding coupling between two parts of a harness comprises a first tubular member attached to one end of one of the parts, a split sleeve slidably carried upon said member and having a tapered circular surface, a union nut also carried upon said member, and a split second tubular member threaded to receive the union nut and dimensioned to receive the end of the first member telescopically, and provided with a tapered circular surface to cooperate with that on the sleeve.

In another way of carrying out the invention, a bonding coupling between two parts of a harness comprises a ferrule of tubular form adapted to be attached to one part and to telescope over the other (or over a member carried thereby), said ferrule having one or more portions providing a split tubular skirt and a groove retaining a rubber or like deformable ring, and a compression clip for radially deforming the split skirt so as to draw it down firmly on to said other part (or member) and compress the ring when a desired position of telescopic adjustment has been achieved.

The invention is illustrated in the accompanying drawings, in which:

Fig. 1 is a sectional elevation of one embodiment;

Figs. 2, 3 and 4 are enlarged views of the parts 1, 7 and 4, respectively, of Fig. 1;

Fig. 5 is a side view, partly in section, of another embodiment;

Figs. 6, 7 and 8 are views, respectively, of parts

8, 9 and 11 of Fig. 6—Figs. 6 and 7 being enlarged; and

Fig. 9 is a sectional elevation of a further embodiment.

Referring to Fig. 1, a tubular member or ferrule 1 having a ring groove 1*a* (see Fig. 2) near one end is attached at its other end to one of the parts 2 to be coupled. Over this ferrule are slipped, in the order stated, a union nut 3, a split sleeve 4 split at 4*a* which can slide on the ferrule 1 and have part of its outer surface tapered at 4*b* (see Fig. 4), and a sealing ring 5 which engages in the ring groove 1*a* and secures the nut 3 and sleeve 4 against loss. To the other coupled part 6 of the harness is attached a second tubular member or nipple 7 (Fig. 3) which is threaded at the end remote from said part to receive the union nut, said end being split or slotted at 7*a* and also internally tapered at 7*b* in correspondence with the taper on the sleeve.

To couple the parts, the ferrule 1 with its sleeve 4 and ring 5 is pushed into the nipple 7 and the nut 3 is screwed up firmly but not tightly. The joint is now made but not locked and the ferrule can be telescoped with reference to the nipple until a desired position of adjustment is obtained; the sealing ring 5 (which is a piston fit in the nipple 7) making a substantially gastight joint. The nut 3 is then screwed up hard, forcing the split tapered sleeve 4 hard into the mouth of the split tapered end of the nipple 7, thus radially distorting these two parts and locking the coupling.

In the embodiment shown in Fig. 5, one part of the harness (for example a flexible tube 2') is fitted into (for example screwed and soldered into) one end of a first circular ferrule 8 (Fig. 6). Over this is fitted and suitably secured the larger diameter end of a second ferrule 9 (Fig. 7), which is of internally stepped formation (i. e., stepped at 9*a*) so as to be of larger internal diameter over part of its length than over the remainder. In the internal step is a rubber or similar packing ring 10 and the two ferrules are so fitted together that this ring lies between the step and the end face of the first ferrule 8. The smaller diameter length of the second ferrule 9 is split longitudinally at 9*b* and has an internal diameter about the same as that of the first ferrule 8 and about the same as the external diameter of the other harness part 6', which is shown as a solid tube. Over the split end of the second ferrule is slipped a compression clip such as a hose clip one form of which is shown separately in side view in Fig. 8.

To couple the parts the solid tube 6' is pushed telescopically through the second ferrule 9 into the first ferrule 8 and when a desired position of telescopic adjustment has been achieved the compression clip 11 is tightened down binding

the split skirt 9*b* firmly on to the solid tube, thereby making a good mechanical and electrical connection which is also by reason of the rubber or like packing ring 10 substantially an air-tight joint.

The modification shown in Fig. 9 will be to a large extent self-explanatory from the figure in view of the description already given of Figs. 5 to 8 inclusive, for Fig. 9 shows a construction which is in main principle the same. In Fig. 9 the rubber or similar sealing ring 10 is positioned in a groove 8*a* formed externally on a solid ferrule 8' secured to one part of the harness 6'. Over the ferrule 8' is a second ferrule 9' which is secured to the other coupled part of the harness 2' (e. g. a flexible tube) and is stepped at 9*a* and provided with a split skirt at 9*b*. A gastight telescopic joint is formed as before between the parts 8', 9' by means of the ring 10 and a hose clip or the like 11 is provided to lock the skirt 9*b* down on to the ferrule 8*a* after telescopic adjustment has been made.

What is claimed is:

1. A coupling for bonding one part of an internal combustion engine ignition screening harness or the like to another, comprising a first tubular member which is carried by one part and is dimensioned and shaped to provide for telescopic movement with reference to a second tubular member, said second member being split longitudinally so as to render it deformable radially, said first tubular member having an annular groove for retaining packing material, and means being provided for producing such radial deformation whereby it may be firmly gripped in any desired position in its range of telescopic adjustment.

2. A coupling as claimed in claim 1, characterized in this, that said first tubular member is attached to one end of one of the parts, a split sleeve slidably carried upon said first member and having a tapered circular surface, said means comprising a union nut also carried upon said first member, said second tubular member being externally threaded to receive the union nut, and dimensioned to receive the end of the first tubular member telescopically, and provided with a tapered circular surface to cooperate with that on the sleeve.

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