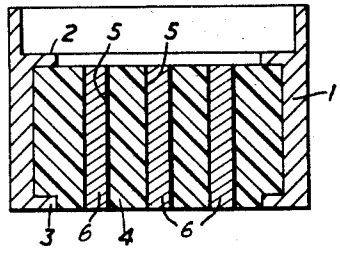
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SEALING BUNGS FOR ELECTRICAL CONNECTOR AND LEAD-THROUGH ARRANGEMENTS AND METHOD

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SEALING BUNGS FOR ELECTRICAL CONNECTOR AND LEAD-THROUGH ARRANGEMENTS AND METHOD

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The invention relates to seals for electrical wires or contact elements of the kind in which the wires or elements extend through a bung of elastomer material which itself is encased in a housing of metal or other relatively rigid material.

The invention has for an object to provide improved constructions of this kind making better use of mechanical qualities of the elastomer.

Where it is desired to conduct electrical wires in a water-tight manner through a partition, it is common practice to employ a bung of an elastomer having holes into which the conductors are forced; in certain electrical connectors, the contact elements are similarly forced into apertures of an elastomer bung so as to have a sealing fit therein. A sealing fit between the bung and the housing body is normally achieved by forcing the bung into the body before the wires or elements are inserted therein, the cross-sectional dimensions of the bung being slightly larger than those of the aperture into which the bung is to be fitted, whereby the elastomer bung is pre-compressed; this compression is further increased upon the insertion of the wires or the like. Since compressibility of the material is limited, this construction sometimes necessitates the use of a rubber bung of greater dimensions than would otherwise be required, in order to withstand the double compression, or alternatively a rubber bung could be employed which only after the insertion of the wires or the like formed a tight seal in the aperture of the body in which it was inserted. Apart from the fact that the seal in said body was not always reliable, the last-mentioned construction led to difficulties in assembly because of the original movability of the bung in the body.

According to the present invention the bung is adhesively secured in an aperture of the housing of greater diameter than the bung itself so as to be tensionally pre-stressed before the insertion of the wires or contact elements.

The compression stress produced by the subsequent insertion of the wires or elements therefore is combined subtractively instead of additively with the pre-stress of the body, a suitable bonding technique being employed for retaining the adhesion of the bung in the aperture. The bung may be secured in position by inserting a bung of smaller diameter into the aperture, after applying a suitable adhesive, for example an epoxy-resin adhesive such as the adhesive known under the registered trademark "Araldite," to the surfaces of the bung and the bore in the body, and then expanding the diameter of the bung, for example by axial compression or by the insertion of mandrels into the holes intended to receive the wires or elements until the adhesive has set.

According to a preferred form of the invention, however, the bung is moulded in the aperture of the body, this aperture having previously been prepared if necessary by a suitable primer to become bonded with the elastomer upon completion of the moulding and curing operation (vulcanisation in the case of rubber). The pre-stress is in this case produced by the shrinkage naturally occurring during the curing process.

The invention is illustrated in the accompanying drawing, which schematically shows the housing and sealing bung of an electric connector member. The housing essentially comprises a metal collar **1** of aluminum or other suitable material and is provided with two inwardly projecting flanges **2** and **3**, and a bung body **4** of suitable silicone elastomer having through-bores **5** is moulded in the collar **1** between the flanges **2** and **3** as shown, after the appropriate surfaces of the collar have been treated with an adhesion-promoting primer. A liquid primer of undisclosed composition sold under the trade name Ms. 602 by Midland Silicones Ltd. in Great Britain, and in the United States by the Dow Corning Company of Midland, Michigan, under the trade name of D.C. 796, has been found highly suitable for improving the bond between an aluminum housing and a bung of silicone rubber cured in situ. When the moulding and curing of the silicone elastomer has been completed, connector contacts **6** having a body portion slightly larger in diameter than the holes **5**, are forced into the holes, whereupon the resultant compression of the material of the bung surrounding the holes ensures a liquid-tight seal between the bung and the current. It will be appreciated that after the moulding and curing, bung body **4** will be found to be still firmly adhering to the internal walls of the collar **1**, the shrinkage inherent in the moulding and curing operation causing the bung body to be under tensional stress, thus affording it an increased yielding capacity to accommodate the expansion of the holes **5** when the contact elements are inserted therein. Due to this increased yielding capacity it will be found possible in many cases to decrease the dimensions of the bung and thus of the coupling or other body, compared with hitherto known constructions in which the bung is subjected to pre-compression.

What I claim is:

1. In an electrical lead-through assembly, the combination comprising a rigid housing having a through aperture, a bung of elastomer material having two end faces spaced by a circumferential surface so shaped and dimensioned as to fit with clearance, when unstressed, into the through aperture of the housing, said bung having at least one through passage interconnecting said end faces said circumferential surface being bonded to the housing in close contact therewith inside the aperture so that the bung is tensionally pre-stressed, and a conductor element fitted under compressive stress in each said through passage of the bung.

2. In an electrical connector member, the combination comprising a metal housing having a through aperture, a bung of insulating elastomer material having two end faces spaced by a circumferential surface so shaped and dimensioned as to fit with clearance, when unstressed, into the through aperture of the housing, said bung having a plurality of through passages inter-connecting said end faces, said circumferential surface being bonded to the housing in close contact therewith inside the aperture so that the bung is tensionally pre-stressed, and a connector contact fitted under compressive stress in each said through passage of the bung.

3. A method of sealingly mounting an electrical conductor element extending through an aperture in a rigid body, which comprises the steps of inserting into said aperture a bung of elastomer material which when unstressed is smaller in diameter than said aperture, forcing the material of the bung radially outwardly into engagement with the inner wall of the rigid body, bonding the bung to the wall of said aperture, and then discontinuing the forcing into engagement of the material of the bung with the inner wall of the rigid body so as to set up a tensional pre-stress in said bung, said bung having a through passage which is a compression fit on the conductor element, and inserting the conductor element into

said through passage so as to superimpose compression stress upon said tensional stress in the bung.

4. A method as claimed in claim 3, wherein the bonding of the bung to the body is effected by inserting a bung of curable elastomer material in said aperture in an at least partially uncured state, and then curing the bung in situ, allowing the shrinkage inherent in the curing process to set up a tensional pre-stress in the bung.

5. A method as claimed in claim 3, which includes the step of applying a setting adhesive to the body surface forming the wall of said aperture and to the corresponding surface of the bung, applying to the bung, after its insertion into the aperture a lengthwise compression force causing the bung to expand radially into contact with said body surface, and maintaining said lengthwise

compression until the adhesive has set to bond the bung to the body.

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