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METAL RECTIFIER ASSEMBLIES

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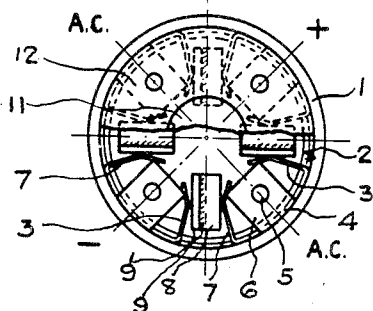


FIG. 1.

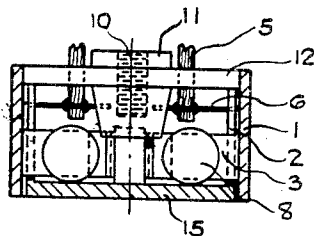


FIG. 2.

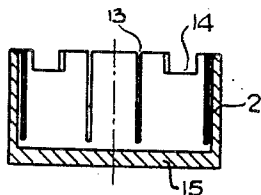


FIG. 3.

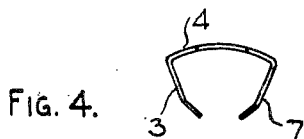


FIG. 4.

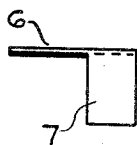


FIG. 5.

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METAL RECTIFIER ASSEMBLIES

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5 Claims. (Cl. 317—234)

This invention relates to metal rectifier assemblies and has for its object to provide assemblies of small dimensions suitable, in particular, for use in electrical measuring instruments, e. g. ammeters and voltmeters of the moving coil type, and commercially known as instrument rectifiers.

Instrument rectifiers are usually of the copper oxide or of the selenium type and, being very small, some difficulty is experienced in their assembly and in making efficient contact with the elements for the purpose of connecting the assemblies in external circuits. Furthermore, the space available for housing the assemblies inside the instrument casing is strictly limited and they accordingly have to be made as small as possible.

A metal rectifier assembly according to the present invention comprises a hollow cylindrical body of insulating material having a number of slots or grooves formed in the wall thereof; a number of connector springs located in the body by the slots or grooves and having each a pair of resilient arms projecting inwardly; a number of metal rectifier elements housed within the cylindrical body, each located by one resilient arm of each of two adjacent connectors so that one electrode of the element is in electrical contact with one of said adjacent arms and the other electrode of the element is in electrical contact with the other one of said arms; a connector tag projecting from each of the connector springs; and a plate of insulating material closing one end of the cylinder.

Preferably the hollow body comprises two concentric cylinders, the connector springs being held between the walls of the two cylinders, the inner of which has formed therein a number of slots through which the resilient arms of the connector springs project inwardly.

The inner cylinder may be cup-shaped, the base thereof forming one end closure of the assembly.

The hollow body is preferably filled with a suitable thermo-setting material.

The invention is illustrated by way of example in the accompanying drawings, of which:

Figure 1 is a plan view of an instrument rectifier embodying the invention, having a part of the closure plate removed to display the arrangement more clearly;

Figure 2 is a sectional elevation of the assembly shown in Figure 1;

Figure 3 is a sectional elevation of the inner cylinder of the assembly shown in Figures 1 and 2; and

Figures 4 and 5 show a connector spring used in that assembly.

The assembly is shown in the drawing to a somewhat enlarged scale for the sake of clarity, the actual over all diameter of the assembly shown being under half an inch.

Referring now to the drawings, a hollow, cup-shaped inner cylinder 2, the base 15 of which forms one end closure of the assembly, fits inside a co-axial outer cylinder 1, a cover plate or disc 12 forming the other end closure of the assembly. The two cylinders 1 and 2 and the cover plate 12 are of a suitable plastic insulating material, such as that sold under the registered trade-mark "Bakelite."

Symmetrically placed around the circumference of the inner cylinder are eight slots 13 and four cut-away portions 14, see Figure 3. Located by these slots are four spring connectors 4, which may be of Phosphor bronze, each having two inwardly extending resilient arms 3, 7 and a connector tag 6, the arrangement being such that the connectors are situated between the walls of the inner and outer cylinders, their resilient arms 3, 7 extending

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through the slots 13 into the interior of cylinder 2 and each connector tag 6 being bent over so that it projects inwardly through one of the cut-away portions 14.

Located between the resilient arm 3 of each spring connector and the resilient arm 7 of each adjacent spring connector is a rectifier element 8, which may be of the copper oxide type, having a layer of semi-conducting material 9 on one side of the base plate, a contact disc 9' being interposed between the element and the resilient arm 3. It will, of course, be appreciated that the thickness of the layer 9 is, in fact, very much thinner than it is illustrated in the drawing. The setting of the arms 3, 7 and their resilience are such that the insertion of the rectifier elements between them forces them apart, their resilience being sufficient to ensure a good electrical contact between the resilient arms, the elements and the contact discs. Electrical connections to external circuits are made by means of wires 5 which pass through holes in the cover plate 12 and are soldered, or otherwise secured, to the bent over tags 6 of the connectors 4, as shown in Figure 2. Alternatively, instead of this method of making the necessary electrical connections, the connection tags 6 may extend upwardly, passing through slots provided in the cover plate 12 for this purpose of passing between the peripheral edge of the cover plate and inside of the wall of the outer cylinder 1, the electrical contacts being made to the tags 6 externally. Alternatively, the connectors 4 may be reversed and the tags 6 project through slots provided in the base 15 for that purpose.

The space within the cylindrical body is filled with Epikote (registered trade-mark) resin, or other suitable setting compound, which hermetically seals the whole assembly and secures the several parts in position.

The cover plate 12 is provided with an axial boss 11 having a tapped hole 10 therein, into which may be screwed, a threaded stud or bolt for mounting the assembly in a desired position.

In an alternative arrangement the cover plate 12 may be made integral with the outer cylinder 1 forming an outer cup-shaped cylinder fitting over the inner cylinder 2, the wires 5 or tags 6 passing through holes or slots provided in one or both of the bases of the two cups, the bases forming the closed ends of the body.

If desired the cover plate 12 may be dispensed with, reliance being placed upon the setting compound for the protection of the parts assembled in the cylindrical body. In this case the outer and inner cylinders are preferably both formed integral with the base 15, forming a single cylinder closed at one end and having an annular space dividing the wall thereof into an inner wall and an outer wall. The spring connections are located in this annular space with their resilient arms 3 and 7 projecting inwardly through slots provided in the inner wall.

A modification not shown, which may be applied to any of the embodiments described above the resilient arms of the spring connectors are so set that, instead of the rectifier elements being arranged as shown in the drawings, they are located so that their longitudinal axes are radial with respect to the cylindrical body. By this means a still further reduction in size is attained but the smaller the size to which it is reduced, the more difficult becomes the assembling of the several parts, so that the advantages of the small size of the complete assembly are eventually outweighed by the disadvantages encountered in assembling the parts.

Having thus described our invention what we claim is: 1. A rectifier assembly comprising, in combination, a hollow cylindrical body of insulating material; a number of connector springs located by the wall of the body and having each a pair of inwardly projecting resilient arms; a number of metal rectifier elements housed within the cylindrical body, each located by one resilient arm of each of two adjacent connectors in such a manner that one electrode of the element is held in electrical contact with one of said adjacent arms and the other electrode is held in electrical contact with the other of said adjacent arms; and means for making external electrical connections to said spring connectors.

2. A rectifier assembly comprising in combination, a hollow cylindrical body of insulating material having an

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inner wall and an outer wall with an annular space therebetween, said inner wall being pierced by a number of axial slots; a number of connector springs located within said annular space and having each a pair of resilient arms projecting inwardly through said slots; a number of metal rectifier elements housed within the cylindrical body, each located by one resilient arm of each of two adjacent connectors in such a manner that one electrode of the element is held in electrical contact with one of said adjacent arms and the other electrode is held in electrical contact with the other of said adjacent arms; and means for making external electrical connections to said spring connectors.

3. A rectifier assembly comprising, in combination, a hollow cylindrical body of insulating material composed of an inner cylinder closed at one end and an outer cylinder fitting over said inner cylinder with an annular space therebetween, the wall of said inner cylinder being pierced by a number of axial slots; a number of connector springs located within said annular space and having each a pair of resilient arms projecting inwardly through said slots; a number of metal rectifier elements housed within the cylindrical body, each located by one resilient arm of each of two adjacent connectors in such a manner that one electrode of the element is held in electrical contact with one of said adjacent arms and the other electrode is held in electrical contact with the other of said adjacent means; a plate of insulating material closing the body at the other end of said inner cylinder; and means for making external electrical connections to said spring connectors.

4. A rectifier assembly comprising, in combination, a hollow cylindrical body of insulating material composed of an inner cylinder closed at one end and an outer cylinder also closed at one end and fitted over said inner cylinder with an annular space therebetween, the wall

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of said inner cylinder being pierced by a number of axial slots; a number of connector springs located within said annular space and having each a pair of resilient arms projecting inwardly through said slots; a number of metal rectifier elements housed within the cylindrical body, each located by one resilient arm of each of two adjacent connectors in such a manner that one electrode of the element is held in electrical contact with one of said adjacent arms and the other electrode is held in electrical contact with the other of said adjacent arms; and conductors extending through at least one of said closed ends and making electrical connections to said spring connectors.

5. A rectifier assembly comprising, in combination, a hollow cylindrical body of insulating material closed at both ends and composed of an inner cylindrical wall and a coaxial outer cylindrical wall with an annular space therebetween, a first set of axial slots piercing said inner wall and a second set of slots at one end of said inner wall, one of said second set and a pair of said first set being arranged alternately, a number of connector springs located within said annular space and having each a pair of resilient arms projecting inwardly through said first set of slots and a connector tag projecting through a slot of said second set; a number of metal rectifier elements housed within the cylindrical body, each located by one resilient arm of each of two adjacent connectors in such a manner that one electrode of the element is held in electrical contact with one of said adjacent arms and the other electrode is held in electrical contact with the other of said adjacent arms; and conductors extending through at least one of said closed ends and making electrical connections to said connector tags.

No references cited.