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SLIP RING ASSEMBLY

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Fig. 1

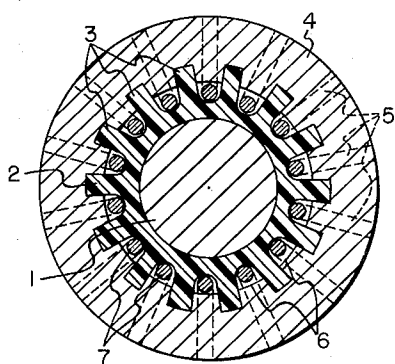
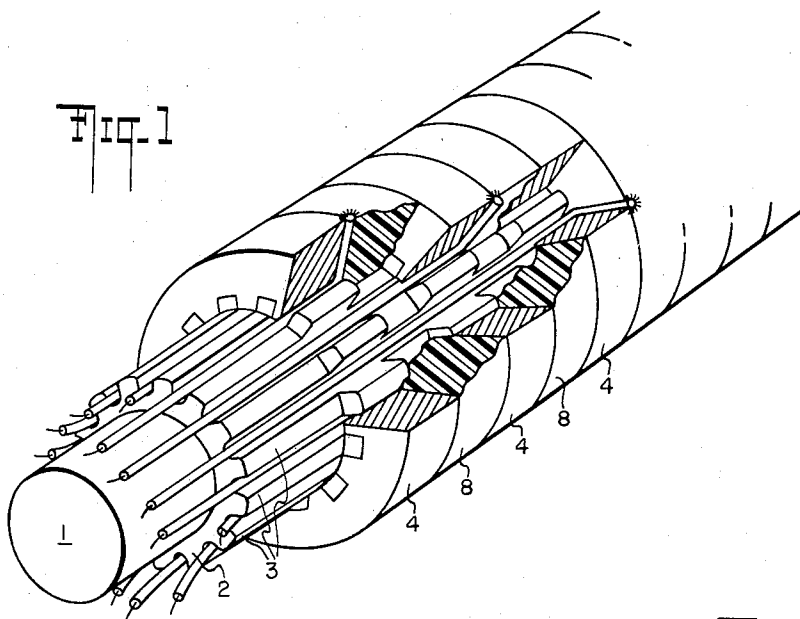
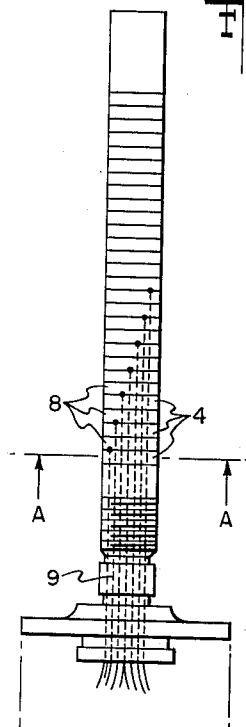


Fig. 3

Fig. 2



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SLIP RING ASSEMBLY

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2 Claims. (Cl. 29—155.5)

The invention relates to multiple slip ring assemblies, the slip rings being of small diameter, and the assembly required to be sized within close limits.

According to one aspect the invention consists of a method of making a slip ring assembly in which a number of rings are cut from a single tube which has been formed with one or more internal keys or keyways, and are keyed on to support means of insulating material.

According to a second aspect the invention consists of a method of making a slip ring assembly in which a number of rings are machined while keyed in to an insulator or insulators supported by a rigid reference member.

A further aspect of the invention consists of a method of making a slip ring assembly in which a metal tube supported by a portion of the partially completed assembly is cut into spaced lengths, each of which lengths forms a separate slip ring of the finished assembly in the position it will have in the finished assembly.

A fourth aspect of the invention consists of a slip ring assembly consisting of a number of rings keyed on to support means of insulating material, in which the rings are spaced from one another and a wire lies in each of one or more slots or channels formed in the support means, and each wire is connected to a different one of the rings.

Another aspect of the invention consists of a slip ring assembly consisting of a number of rings keyed on to an insulator or insulators supported by a rigid reference member, in which the rings are spaced from one another, and a wire lies in each of one or more slots or channels formed in or defined by the insulator or insulators, and each wire is connected to a different one of the said rings.

In order that the invention may be clearly understood and readily carried into practice, an embodiment thereof will now be described by way of example only, with reference to the accompanying drawings.

In the drawings:

FIGURE 1 is a scrap perspective view, partly cut away, of an embodiment of the invention.

FIGURE 2 is an elevation of the embodiment shown in FIGURE 1.

FIGURE 3 shows a cross section taken at the position marked AA (FIG. 2).

In one embodiment the slip ring assembly consists of a steel reference rod surrounded by an epoxy-resin sleeve, supporting and insulating from each other, a series of plated brass slip rings. The wire connections of the slip rings are led inside the epoxy-resin sleeve parallel to the axis of the rod, and emerge at one end of the assembly.

The slip ring assembly is supported with one end coaxially mounted in the bore of the central pivot of a ball bearing assembly.

In making one embodiment of the invention (FIG. 1) a steel reference rod 1 having centres at each end has a cylindrical sleeve 2 formed of an epoxy-resin, moulded around it. The sleeved rod is held in a gear cutting machine by the centres, and is machined to form equispaced splines 3 around the cylindrical surface of the epoxy-resin sleeve, which splines are cut parallel with the axis of the rod, and are in number equal to the number of

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slip rings 4. A brass tube is broached to have splines along its inner cylindrical surface, and is press-fitted over the epoxy-resin sleeve with the two sets of splines mating together.

The two sets of splines form an interference fit: the splines 5 (FIG. 3) cut in the inner cylindrical surface of the tube are truncated so that when the tube is press-fitted over the splined epoxy-resin sleeve, hollow channels 6 are formed between the tips of the truncated splines the sides of the epoxy-resin splines and the spline roots between them. To ensure correct fitting of the splines of the epoxy-resin sleeve with the internal splines on the brass tube, the broach used to cut the splines in the bore of the tube is machined by the same cutter used to machine the splines on the epoxy-resin sleeve.

The assembly is again set up between centres and a number of circumferential grooves are machined in the periphery of the brass tube to divide the tube into spaced rings, each coaxial with the reference rod. These rings form the slip rings 4 in the completed assembly. The grooves are cut slightly deeper than the thickness of the tube and a little way into the epoxy-resin sleeve. This helps to throw up burrs which assist in holding the rings against axial movements, while the splines hold the rings against any rotary movement. A wire 7 is passed down each of the hollow channels 6 from one end, and each wire is bent up and soldered to the side of a different one of the rings. Between certain adjacent rings the wires are tied down to the bottom of the channels with silk thread so that the wires are held away from contact with the rings except where they are bent up and soldered. An epoxy-resin coating 8 is then moulded round the ringed and resin-coated rod, and fills the gaps between the rings. After the resin has set, the outer layers are machined away until the brass rings, which are now held firmly in position and insulated from each other, are exposed, and are of the required outside diameter. One end of the slip ring assembly is machined to be a push-fit into the bore of a pivot 9 (FIG. 2) which is to support the assembly. The slip rings are nickel-plated and then rhodium-plated, and the prepared end of the slip ring assembly thrust into the pivot bore and secured, for example, with an adhesive.

Advantages provided by this embodiment are an economy of space, and a rigid reference rod to reduce any tendency to fracture or flex while being machined.

A further advantage provided by the embodiment is that no expensive metal rings are required to build up an assembly.

A modification of the above described embodiment includes a rigid reference tube instead of the steel reference rod, the connecting wires to the slip rings being passed through holes radially drilled in the tube circumference, and then passed along the length of the tube and parallel to its axis.

In a modification one of the rings is circumferentially incomplete in the path of the brush so that a switching action occurs as the assembly rotates. The discontinuity is readily formed by radially drilling a hole of appropriate diameter, and at the required position, in the tube before the rings are separated from each other. The discontinuity should not extend across the full width of the ring but a narrow neck should be left to help the ring to keep its shape.

What is claimed is:

1. A method of making a slip ring assembly including the steps of forming a predetermined number parallel longitudinal splines along the outer curved surface of a cylindrical support member, said outer surface comprising electrical insulating material, forming an equal number of truncated parallel longitudinal splines along the in-

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ner cylindrical surface of a hollow conductive tube for mating with said splines on said support member to form a secure fit, said truncated splines forming hollow channels between the tips of said truncated splines and said support member when said support member and said tube are fitted together, fitting said support member within said tube by mating their respective splines to form said longitudinal hollow channels and to render said support member and said tube coaxial, said fitting also prevents rotation of said tube relative to said support member, cutting said tube into spaced lengths along the longitudinal axis thereof whereby each of said lengths forms a separate slip ring in the position it will have in the finished assembly, inserting a separate wire into each of a number of said hollow longitudinal channels, each wire having a diameter smaller than that of its channel connecting each wire to a different one of said slip rings and filling the spaces between said slip rings with an electrical insulating material.

2. A method of making a slip ring assembly as claimed in claim 1 including the step of cutting slightly deeper than the thickness of said tube and into said support

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member to assist in holding the slip rings against axial movement.

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