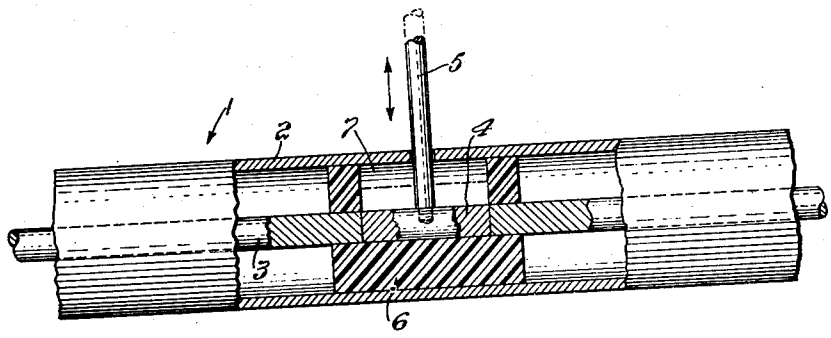
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COAXIAL LINE SWITCH

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COAXIAL LINE SWITCH

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1 Claim. (Cl. 200—153)

This invention relates to an electric switch and more particularly to one adapted for switching a section of a coaxial line.

Various types of electric switches and connectors have been proposed for switching and interconnecting coaxial transmission lines. In one type of on-off coaxial switch used heretofore the center conductor of the coaxial line is broken by having a section of this center conductor move in a direction axial to this center conductor. The principal disadvantage of such a switching arrangement is that for a fixed inner diameter of coaxial line the amount of throw required, within ordinary limits, to obtain a given attenuation is directly proportional to the attenuation required. In addition, where a solid center conductor is used, part of the center conductor must be made of hollow construction in order to accommodate the axially moving section.

Furthermore, in many high-frequency application it is desired to obtain a high degree of attenuation where only a limited movement of the center conductor section is structurally feasible. Inasmuch as the amount of throw with an axially moving center conductor section is directly proportional to the attenuation, an increase in attenuation while keeping the available axial movement of the center conductor section constant cannot be obtained.

It is an object of the present invention, therefore, to provide a new and improved electric switch which requires a relatively small throw to obtain a high degree of attenuation. It is a further object to provide such a switch which is relatively simple and inexpensive to construct and yet will maintain the electrical parameters of the coaxial line of which it is a part.

It is a feature of the present invention that a section of the center conductor of a coaxial line is interrupted by moving this section in a direction radial to the coaxial line. Additional objects and features of this invention may be seen in the accompanying drawing wherein a coaxial line employing this type of switch is shown in an elevational view partly in section.

Referring to the drawing, a coaxial line **1** is shown with an outer metallic conductor **2** and an inner metallic conductor **3**. The radially moving portion **4** of the center conductor is shown attached to a rod **5** preferably made of an insulating dielectric material having a low electrical loss. Dielectric materials such as cross-linked polystyrene, polyethylene, amber or the like are suitable. Contained within the coaxial line is a dielectric supporting bead **6** of material similar to that of the rod **5**. As may be seen from the drawing, the bead **6** is recessed at **7** to allow for radial movement of the center conductor

section **4** and attached rod **5**. The center and outer conductors may be made of any metallic material such as is used for transmission lines. Copper is commonly employed. It will be apparent upon reference to the drawing that many modifications in the construction and arrangement of the supporting dielectric **6** may be made without departing from the basic spirit of this invention. Thus, for example, the support may consist of two separate annular beads disposed at opposite ends of the moving section of center conductor. What is important to observe is that the center section **4** can move freely in a radial direction, substantially at right angles to the longitudinal axis of the coaxial cable. The dielectric bead is preferably force-fitted into place, although other methods of attachment such as direct attachment to the outer conductor by means of screws or rivets or other bonding materials may be made.

If D represents the internal diameter of the outer shell of the coaxial line and d represents the outside diameter of the center conductor, then it is apparent that for any given length of center conductor section moved the total amount of throw will be represented by $\frac{1}{2}(D-d)$. The amount of attenuation obtained will be approximately proportional to the length of the moving center section. The frequency response of the foregoing line can be readily adjusted by varying the dielectric constant of the dielectric bead and by varying its design so that it responds with given broad band or narrow band frequency characteristics. Similarly, the standing wave ratio present may be compensated for by matching techniques well-known to those skilled in the transmission line art.

In a test made using this radially moving coaxial switch, it was found that at a frequency of 5650 megacycles for a ⅜ inch outside diameter coaxial line and for a center conductor length of ¾ inch the measured attenuation was of an order of 50 decibels for a throw of only 0.085 inch. This attenuation is considerably greater than may be obtained for a corresponding throw with an axially moving center conductor.

While I have described above the principles of my invention in connection with specific apparatus, it is to be clearly understood that this description is made only by way of example and not as a limitation to the scope of my invention as set forth in the objects thereof and in the accompanying claim.

I claim:

A coaxial electric switch comprising inner and outer conductors, said inner conductor having a section movable radially to break conduction along said inner conductor while maintaining said outer conductor stationary, a bead of dielectric material disposed in said outer conductor to support said inner conductor axially thereof, said bead having a recess in one side thereof to receive said section, said outer conductor having an opening therethrough in alignment with said recess, and means extending through said opening for moving said section radially out of alignment with said inner conductor and into said recess.

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