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ELECTRICAL SWITCH

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9 Claims. (Cl. 200—27)

This invention relates to electrical switches and more particularly to means for reducing undesired electrostatic voltages originating in the switch mechanism.

In rotary or like switches used in electronic systems for obtaining accurate samples of a plurality of voltages, spurious voltages which modify the samples are obviously objectionable. For example, in a switch of this type known as an automatic zero set switch, and which samples successive voltages from a plurality of circuits and passes the samples on for controlling the apparatus, a spurious voltage will cause a false correction to be made.

One kind of switch of this type comprises a plurality of equally spaced cantilever-type, contact springs arranged in circular array and adapted to be successively and momentarily flexed into contact with a common electrode. The common electrode comprises a ring mounted in spaced relation to the array. The flexing of each spring is accomplished by means of a rotating arm and roller system. An insulating ring having guide holes or slots is used to constrain each contact spring to a substantially radial path. In such a device it has been found that spurious voltages of electrostatic origin occurred, apparently produced by rubbing of the contact springs on the surfaces of the insulating guide.

An object of this invention is to reduce spurious voltages in automatic zero set and like switches.

Another object of this invention is to reduce the vibration of a cantilever spring-type of contactor.

One feature of this invention resides in a metallic shield or sheath for separating the movable switch elements of a switching assembly from their insulating guides.

Another feature of the invention involves electrical connection between the movable switch element and its metallic shield or sheath in an assembly of this type.

A further feature of this invention involves a combined shield and switch element in which the switch element is secured in good mechanical and electrical connection with the shield.

Other and further objects and features of this invention will appear more fully and clearly in the following description of illustrative embodiments of the invention taken in connection with the appended drawings in which:

Fig. 1 is a view partly in section, taken on line 1—1 of Fig. 2, of a rotary-type switch assembly embodying this invention;

Fig. 2 is a plan view of the switch assembly of Fig. 1;

Fig. 3 is an enlarged longitudinal sectional view of one form of combined contactor and shield of this invention;

Fig. 4 is a view of a switch operating roller showing structural details; and

Fig. 5 is a fractional detail view showing a modified form of shield.

As shown in Figs. 1 and 2, the switch assembly comprises a cylindrical housing 10 in which are secured spaced discs or plates 11 and 12 and ring 13 for supporting the various elements of the assembly. The discs or plates 11 and 12 and the ring 13 are advantageously of insulating material.

A motor 14, mounted centrally of the plates 11 and 12, drives a shaft 15 which supports and rotates arms 16. Contact operating rollers 17 are rotatably mounted in forked ends of the arms 16 by conventional means.

The rollers 17 may comprise a bearing 20, advantageously a ball or roller bearing, an insulating body 21 advantageously of non-polar dielectric material such as polystyrene, and a metallic shoe or tire 22, as shown in Fig. 4.

Arranged in circular array around the axis of shaft 15, supported by plates 11 and 12 and by ring 13, are a plurality of contactor members designated generally as 23. A common contact ring 24 is secured to one face of the insulating ring 13 adjacent these contactor members.

The contactor members may each comprise a tubular shield or sheath 25 in one end 26, of which is secured a cantilever spring contactor 27. The shields or sheaths 25 comprise metallic linings for the orifices in supporting plates 11 and 12 and ring 13. Each shield 25 has a notch or slot 28 for accommodating the rollers 17 and a cut-away portion forming a shoulder 29 fitting around the contact ring 24. The shield illustrated in Figs. 1, 2 and 3 is circular in section, but some other section such as oval, square, or channel shaped may be used.

The shield or sheath 25a, shown in Fig. 5, is of channel shape having its opening toward the contact ring 24. Except for having one open side, this sheath is the same as the sheath 25 and the associated elements are all like those in Fig. 3.

In either embodiment, the sheath and the spring contactor advantageously are made of the same metal to avoid any possibility of electrolytic or electrothermal reaction among the parts.

The cantilever spring contacts 27 are in the path of the rollers 17 and are successively flexed into momentary contact with the contact ring 24 as the rollers are rotated.

The shield 25, being in close proximity to the spring 27, tends to damp its vibration, thereby inhibiting undesired modes of vibration such as unwanted harmonics. The damping of such vibrations has as one of its purposes the reduction of fatigue in the spring members and the prolonging of the life of the switch.

Since the metallic linings or sheaths separate the spring contactors from the insulation of the mountings, the possibility of spurious voltages due to the rubbing of the springs on the insulation is eliminated by the construction of this invention.

What is claimed is:

1. Switching means comprising an arcuate common contact, a plurality of contactors arcuately arranged adjacent thereto, an arcuate insulator having a plurality of metal-lined guide orifices, one for each of said contactors, and a rotatable roller for moving each contactor successively into contact with the common contact, the lining and contactor associated with each orifice being combined and comprising an elongated metal sheath and an elongated metal cantilever spring within the sheath and secured thereto at one end only, the sheath including adjacent the free end of the spring an opening each for the roller and the common contact.

2. Switching means comprising an arcuate common contact, a plurality of contactors arcuately arranged adjacent thereto, an arcuate insulator having a plurality of spaced metal-lined guide orifices, one for each of said contactors, and a rotatable roller for moving each contactor successively into contact with the common contact, the lining and contactor associated with each orifice being combined and comprising an elongated metal sheath of circular section and an elongated metal cantilever spring within the sheath and secured thereto at one end only, the sheath including adjacent the free end of the

spring an opening each for the roller and the common contact.

3. Switching means comprising an arcuate common contact, a plurality of contactors arcuately arranged adjacent thereto, an arcuate insulator having a plurality of radially extending metal-lined guide slots, one for each of said contactors, and a rotatable roller for moving each contactor successively into contact with the common contact, the lining and contactor associated with each slot being combined and comprising an elongated metal sheath of channel section and an elongated metal cantilever spring within the sheath and secured thereto at one end only, the sheath including adjacent the free end of the spring an opening for the roller.

4. Switching means comprising an arcuate common contact, a plurality of contactors arcuately arranged adjacent thereto, an arcuate insulator having a plurality of metal-lined guide orifices, one for each of said contactors, and rotatable means for moving each contactor successively into contact with the common contact, the lining and contactor associated with each orifice being combined and comprising a metal sheath and a metal spring within the sheath and secured thereto at one end only, the sheath including adjacent the free end of the spring an opening each for the rotatable means and the common contact.

5. Switching means comprising an arcuate common contact, a plurality of contactors arcuately arranged adjacent thereto, an arcuate insulator having a plurality of metal-lined openings, one for each of said contactors, and a rotatable roller for moving each contactor successively into contact with the common contact, the lining and contactor associated with each opening being combined and comprising an elongated sheath and an elongated spring within the sheath and secured thereto at one end only, the clearance between the sheath and the spring being small to aid in damping vibration of said spring.

6. Switching means comprising a common contact ring, a plurality of contactors arranged adjacent to and within said ring, an insulator ring having a plurality of metal-lined guide orifices, one for each of said contactors, and a rotatable roller for moving each contactor successively into contact with the common contact, the lining

and contactor associated with each orifice being combined and comprising an elongated metal sheath of circular section and an elongated metal cantilever spring coaxial with the sheath and secured thereto at one end only, the sheath including adjacent the free end of the spring an opening each for the roller and a portion of the common contact ring.

7. Switching means comprising a circular common contact, a plurality of spaced contactors circularly arranged within the common contact and adjacent thereto, a circular insulator having a plurality of metal-lined guide orifices, one for each of said contactors, and rotatable means for moving each contactor successively into contact with the common contact, the lining and the contactor associated with each orifice being combined and comprising an elongated cylindrical sheath, an elongated spring coaxial therewith and secured thereto at one end only, the sheath adjacent the free end of the spring having an opening for the rotatable means and a notch to accommodate a portion of the common contact.

8. Switching means comprising a circular common contact, a plurality of spaced contactors circularly arranged within the common contact and adjacent thereto, a circular insulator having a plurality of metal-lined guide orifices, one for each of said contactors, and rotatable means for moving each contactor successively into contact with the common contact, the lining and the contactor associated with each orifice being combined and comprising an elongated cylindrical sheath, an elongated spring coaxial therewith and secured thereto at one end only, the sheath being closely adjacent the spring for aiding in damping spring vibration.

9. Switching means comprising a common contact, a plurality of spaced contactors adjacent the common contact, an insulator having a plurality of metal-lined guide orifices, one for each of said contactors, and means for moving each contactor successively into contact with the common contact, the lining and the contactor associated with each orifice being combined and comprising an elongated sheath, an elongated spring within the sheath and secured thereto at one end only.

No references cited.