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ELECTRIC SWITCH

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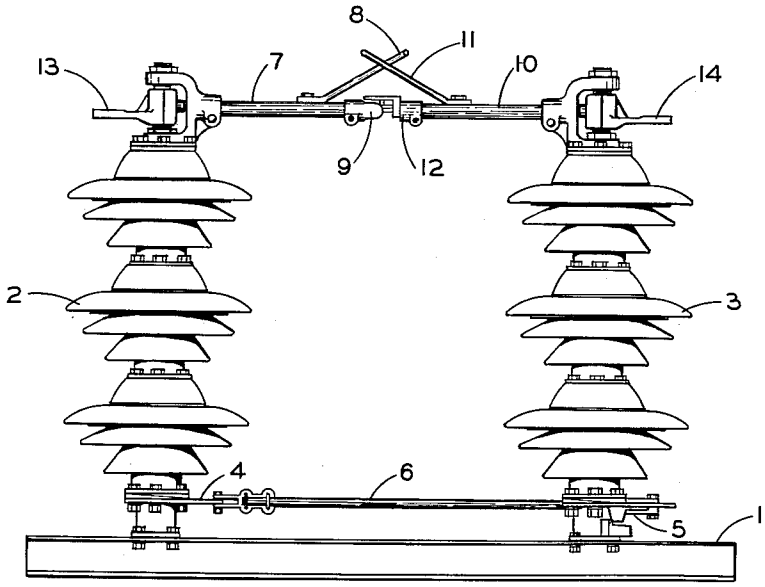


FIG. 1

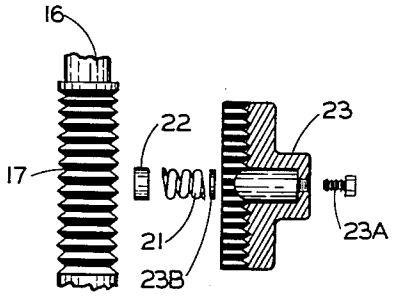


FIG. 4

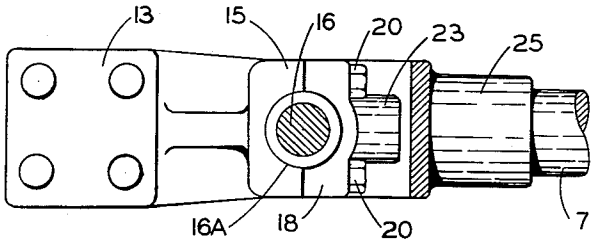


FIG. 3

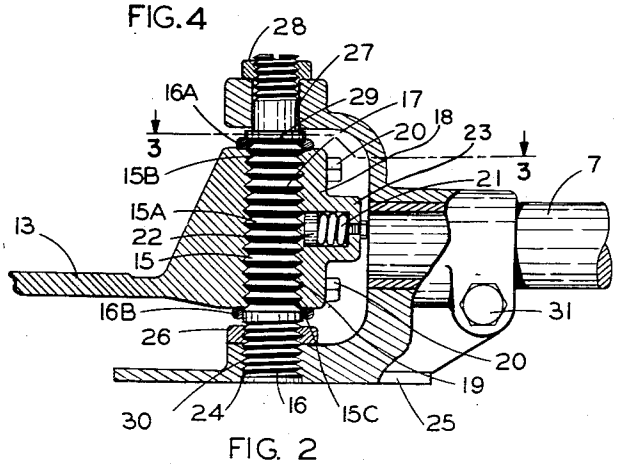


FIG. 2

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# ELECTRIC SWITCH

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This invention relates to electric switches and more particularly to a low friction shuntless pivot or hinge construction for high capacity switches.

In order to eliminate flexible shunts in high capacity switches it is necessary to provide relatively movable high pressure internal contacting surfaces so as to keep the electric resistance at a minimum. Such high pressures naturally tend to increase friction and thereby to interfere with the mechanical operation of the switch. Furthermore, the means by which high pressure contact is achieved may not maintain uniform contact pressure for prolonged periods due to the deleterious effects on the force applying spring parts due to the passage of high current through the switch and spring parts.

A principal object of this invention is to provide an improved shuntless hinge for high capacity switches which affords a maximum of conductivity and a minimum of friction between the relatively movable switch parts.

Another object of this invention is the provision of an improved electric switch of the high capacity type in which both the mechanical and electrical operating characteristics of the switch are substantially uniform over a prolonged period of time.

The invention in one form as applied to the so-called side break or center break type of switch may comprise a stationary terminal having a cyclindrical cavity with peripheral parallel grooves therein, a cylindrical part secured to and movable with the switch blade and constituting the pivot thereof, the cylindrical part being provided with a plurality of parallel grooves which nest with the grooves in the cavity formed in the terminal, and radially disposed force applying means mounted in the terminal and in engagement with the cylindrical member to urge it into snug engagement with the grooved cavity in the terminal in the region thereof opposite from the force applying means.

For a better understanding of the invention reference may be had to the following detailed description taken in conjunction with the accompanying drawings in which FIG. 1 is a side view of a center break type switch to which the invention is applicable; FIG. 2 is a cross-section of a hinge element constituting essentials of the invention; FIG. 3 is a plan view partially in section of the structure shown in FIG. 2 taken along the line 3—3 indicated on FIG. 2; and in which FIG. 4 is an enlarged exploded view of a portion of the structure shown in FIGS. 2 and 3.

With reference to FIG. 1, the numeral 1 designates a supporting structure for the rotatable insulator stacks 2 and 3. Insulator stack 2 is provided with a crank arm 4 while insulator stack 3 is provided with a similar crank arm 5. These two crank arms 4 and 5 are interconnected by a transversely disposed lever 6. The crank arms 4 and 5 are mounted on opposite sides of the insulator stacks 2 and 3 so that sidewise motion of the crank arm 6 causes insulator stack 2 to rotate in a direction opposite from the direction in which the insulator stack 3 rotates as viewed from above. Securely affixed to the insulator stack 2 is a laterally disposed switch arm 7 on which an arcing horn 8 and a conventional contact 9 are mounted. Likewise a switch arm 10 is securely affixed to the upper end of the insulator stack 3. An arcing horn 11 and a conventional contact 12 are mounted on the switch arm 10. Thus in operation, sidewise bodily movement of lever 6 imparts rotation to insulator stacks 2 and 3 in opposite directions and causes contacts 9 and 12 to swing relative to each other in performing switch opening and closing operations.



The circuit controlled by the switch depicted in FIG. 1 is connected to terminals 13 and 14 and of course current flows through the switch arms 7 and 10 and contacts 9 and 12. During opening movement of the switch blades 7 and 10 the terminal elements 13 and 14 remain stationary. Thus the structure comprising this invention establishes a shuntless connection between terminal 13 and switch blade 7 and also may be applied to establish a similar connection between switch blade 10 and terminal 14. As described below the invention is applied to terminal 13 and blade 7.

With reference to FIG. 2, the terminal element 13 is provided with an arcuate recess 15 in which a plurality of parallel grooves 15A are formed. The terminal 13 constitutes a first conducting member which is cooperatively disposed with respect to a second conducting member 16, the central portion of which is provided with a plurality of parallel external grooves 17, the parts being held in the positions depicted in FIG. 2 by retaining means 18 which is provided about its inner surface with an arcuate portion on which a plurality of parallel grooves 19 are formed. The retaining element 18 is secured to the first conducting member 13 by a plurality of bolts 20. In accordance with a feature of the invention the first conducting member 13 is maintained in electrical contact with the second conducting member 16 by a force applying means in the form of a compressional spring 21 and an insulating disc 22 which are disposed within a radially extending passage 23 formed in the retaining means 18. The force of spring 21 is regulated by an adjusting screw 23A which is in threaded relation with the retaining element 18 and which engages a disc 23B which in turn engages spring 23. Thus it will be understood that the force of spring 21 urges the conducting member 16 toward engagement with the arcuate recess formed in the terminal 13 so that the complementary grooves on these parts are maintained in snug current carrying relation. As indicated in FIG. 2, suitable grommet seals 16A and 16B could be mounted on element 16 at the ends of the grooved portion. Such seals could be of yieldable material such as rubber or plastic and would prevent dust or other matter from accumulating on the grooved parts.

The conducting member 16 is threaded into a threaded opening 24 formed in bracket 25 which is affixed to the top of insulator stack 2. Conducting element 16 is locked in its normal position by the lock nut 26. Element 16 is inserted from below and extends upwardly through an unthreaded opening 27 formed in the upper arm of bracket 25 and a lock nut 28 secures the upper portion of the bracket 25 into snug engagement with the rim 29 formed on conducting element 16. In this connection it will be understood that the threaded opening 24 is larger than the rim 29 and also is large enough to receive the entire conducting element 16 which is inserted from below and threaded into the opening 24 via the threads 30.

Switch blade 7 is securely affixed within the bracket 25 by a bolt 31 which clampingly engages the switch arm 7 in known manner.

From the description of the structure as set forth above it will be obvious that the force applying spring 21 does not conduct current due to the insulating action of the disc 22. Furthermore, this fact results in complete freedom of the spring 21 from the deleterious effects of high currents so that its force applying properties are maintained substantially uniform over prolonged periods of time. Furthermore, from the structure described above it will be understood that the friction between the conducting terminal 13 and the conducting member 16 and parts asso-

ciated therewith is held to a minimum due to the fact that the action of spring **21** is in a transverse direction. It will also be understood that the particular arrangement whereby the spring pressure is applied in a direction transverse to the axis of element **16** results in a maximum conductivity due to the snug engagement between the grooves formed in the cavity of the conducting terminal **13** and the complementary grooves formed externally on the conducting element **16**.

Preferably, of course, all current carrying parts such as the terminal **13** and the conducting member **16** should be of bronze or other suitable conducting material while the spring **21** ordinarily is of spring steel construction and for purposes of insulation with a minimum of resistance and abrasion to the grooves formed on element **16** I have found plastic material such as is sold under the trademark "Kylon" to be suitable for the insulating disc **22**. If desired, the middle portion of conducting element **16** could be made smooth, i.e. without grooves to provide a smooth surface to be engaged by disc **22**.

While we have shown and described a particular embodiment of the invention, we do not wish to be limited thereto and intend in the appended claim to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What we claim as new and desire to secure by Letters Patent of the United States is:

An electric switch comprising a stationary terminal having a cyclindrical cavity with a plurality of parallel grooves formed about its periphery, a bracket having a pair of spaced apertures coaxially disposed at the ends of said cavity, one of said openings being threaded and being larger than the other and the other of said openings being unthreaded, a switch arm mounted on said bracket and arranged for swinging movement about said cavity as a pivot, a cylindrical conducting member having one end



portion thereof in threaded engagement with the threaded one of said openings and having a plurality of parallel grooves formed about the mid-portion of its periphery, said cylindrical conducting member being disposed within said cavity in nested relation with the grooves on said cylindrical member and having the other end disposed in the unthreaded one of said openings, a pair of lock nuts in threaded engagement with said cylindrical conducting member and respectively in close frictional contact with said bracket adjacent said openings for causing said cylindrical conducting member to move in unison with said blade and bracket, a radially disposed recess formed in said terminal and communicating with said cavity, a compression spring disposed radially within said recess, an insulating element interposed between said spring and said cylindrical member, the force of said spring being imparted through said insulating element to urge said terminal cavity into snug engagement with said cylindrical conducting member in the region of said cavity opposite from said recess, and a pair of sealing elements disposed about said cylindrical conducting member and respectively engageable with opposite parts of said stationary terminal at the ends of said cavity to isolate the grooves of said conducting members from dust or other undesirable substance from the atmosphere.


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