Aug. 10, 1965 J. A. TURGEON 3,200,229

SEALED HINGE FOR ELECTRICAL SWITCH

Filed April 30, 1962

FIG. 1.

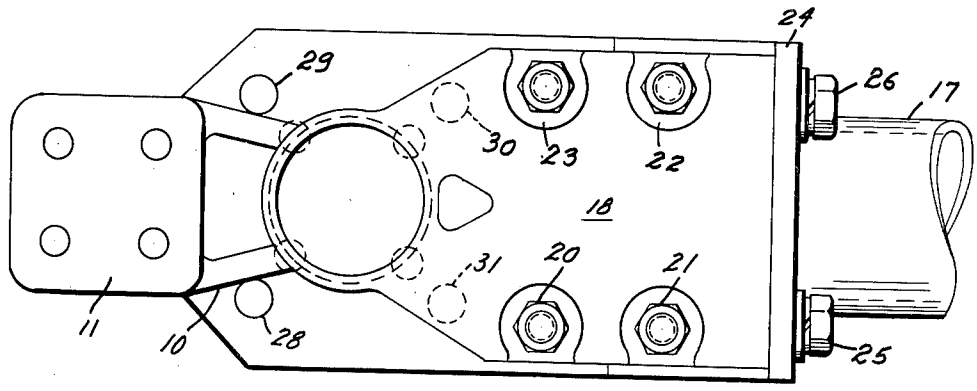
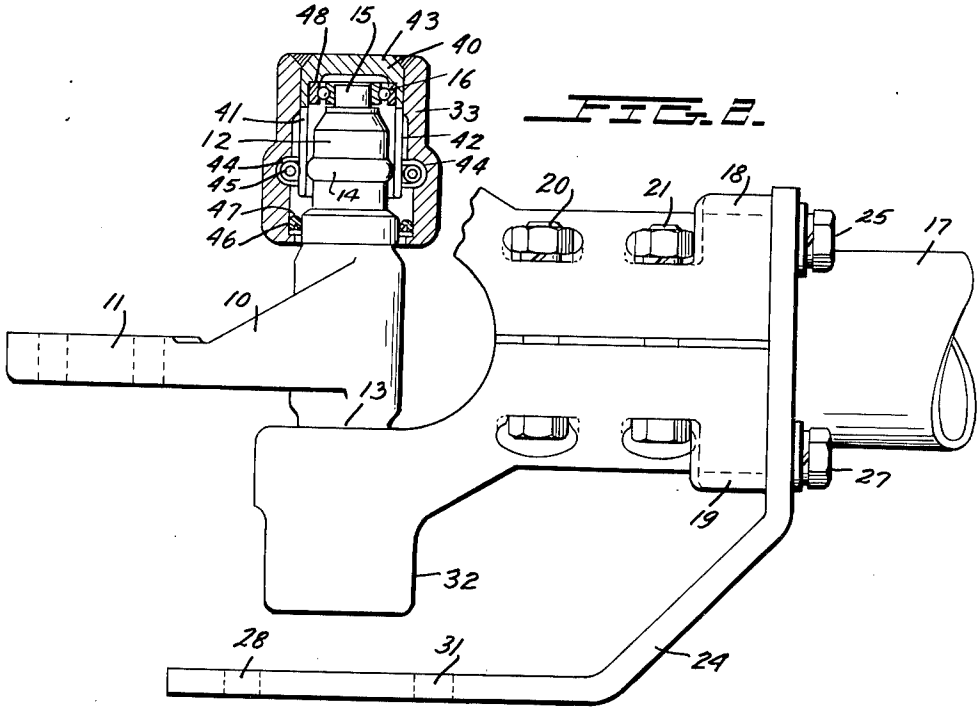


FIG. 2.



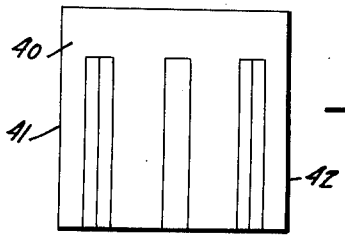


FIG. 3.

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SEALED HINGE FOR ELECTRICAL SWITCH

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10 Claims. (Cl. 200—170)

My invention relates to a novel sealed hinge construction for electrical switches, and more specifically relates to a novel sealed hinge construction for electrical switches having aluminum switch blades.

Switches of the type to which the invention is directed are well known in the art, and are rated, for example, in the order of 69 kv. to 230 kv. at 16,000 amperes. In such switches, the long switch blade is pivotally mounted to a support structure where the pivotal mounting both mechanically and pivotally supports the blade, and also serves as a current path from the blade to the stationary support structure.

It is extremely desirable with such arrangements to provide sealing means about the hinge to prevent exposure of the hinge to the external atmosphere which includes corrosive elements and dirt which could mechanically interfere with the desired low resistivity of the hinge.

The present invention provides a novel hinge arrangement having low friction mechanical bearing means therein, and which provides very efficient mechanical and electrical connection between the blade and its stationary support. Moreover, the hinge is simple in manufacture and maintenance, and can be filled with a potting medium to enhance the sealing qualities of the hinge.

It is, therefore, a primary object of this invention to provide a novel highly effective sealed hinge for high voltage switches.

A further object of this invention is to provide a novel sealed hinge for high voltage switches which is simple in manufacture and maintenance.

A still further object of this invention is to provide a novel sealed hinge for high voltage switches which is simple to install.

Another object of the invention is to provide a novel hinge for electrical switches which has a low friction roller bearing therein.

These and other objects of my novel invention will become apparent from the following description when taken in connection with the drawings, in which:

FIGURE 1 shows a top view of the hinge of the present invention.

FIGURE 2 shows a side view of the hinge of FIGURE 1 wherein the hinge is shown partially in cross-section.

FIGURE 3 shows a side view of the elongated contact cup within the sealed hinge housing.

Referring now specifically to FIGURES 1 and 2 which show the invention as applied to a side opening switch, the switch includes a stationary terminal casting 10 which has a terminal pad 11 with appropriate openings therein for making line connections to the circuit which is to receive the switch. The stationary terminal casting 10 is preferably constructed of aluminum, but may alternatively be formed by copper, and is provided with first and second extending cylindrical sections 12 and 13 where extension 12 is best shown by virtue of the hinge housing being cutaway. Extension 13 is constructed in a manner identical to that to be described hereinafter for extension 12. Extension 12 is provided with an annular extending stationary contact portion 14 which could, for example, be coated with appropriate high conductivity material particularly adapted for contacting purposes. The outer end of extension 12 is then narrowed as at necked-down portion 15 to receive a roller bearing 16 which could be

placed thereon as by a force fit or any other desired manner.

The switch then further includes an elongated blade 17 which extends outwardly to terminate in a movable contact (not shown) which moves into and out of engagement with an appropriate cooperating contact which is connected to the second terminal of the switch (not shown). The blade 17 is further formed of aluminum or could be formed of copper in the usual manner.

The left-hand end of blade 17 is then clamped by the blade clamps 18 and 19 which are secured together by bolts 20 through 23 which extend through appropriate aligned openings in clamps 18 and 19. Prior to the assembly of clamps 18 and 19 and blade 17, the support strap 24 which has an opening therein for receiving blade 17, may be secured to the clamps 18 and 19 as by the bolts 25, 26, 27 and another (not shown). The strap 24 has openings 28, 29, 30 and 31 which are connectable to a rotatable insulator stack which provides the mechanical support for the left-hand end of the switch shown in FIGURES 1 and 2, and causes side-opening of blade 17 when the stack is rotated.

Each of clamps 18 and 19 terminates in housing portions 32 and 33, as best shown in FIGURE 2. The housing portions 32 and 33 may be cast integrally with clamps 18 and 19 with their ends opened as by machining after the casting operation. Therefore, a contact cup 40 shown in FIGURES 2 and 3, and which includes a plurality of extending contact fingers such as contact fingers 41 and 42, are inserted into the open end of the housing, as illustrated, and a cover plate such as plate 43 is welded into the position shown in FIGURE 2 so as to retain the housing 33, contact cup 40, and cover 53 as an integral unit. It will be noted that the housing 33 is also provided with an annular groove 44 which receives an annular spring 45 which serves to exert radially inwardly directed pressures on the contact fingers 41, 42.

The housing portion 33 further includes a second annular groove 46 which receives a seal 47 which serves to seal the inner end of casting 33 after assembly of the hinge.

In order to assemble the hinge, when placing clamps 18 and 19 into position, they are arranged to have their casting portions 32 and 33 brought over extensions 12 and 13 respectively. The bearing 16 then slides into a shoulder 48 of the elongated contact cup 40, while the extended annular portion 14 of extension 12 enters into the elongated fingers of contact cup 40 in high pressure contact engagement. Thereafter, the cavity may be filled with an appropriate potting medium such as a grease to insure adequate sealing within the cavity.

The method of assembly described above could, of course, be varied in many respects. By way of example, the spring 45 may be carried within annular depression 44 of housing 33 prior to assembly of contact cup 40, bearing 16 and cover 43. Once the housings 32 and 33 are in position with respect to extensions 12 and 13, the contact cup 40 can be inserted from the open end of the housings and forced down over the bearing 16. Thereafter, the cover 43 may be placed in position and welded or secured in any other desired manner.

Whichever method of assembly is used, the final result is one in which the castings 18 and 19 and blade 17 are electrically connected to pad 11 through the circuit which includes blade 17, castings 18 and 19, housings 32 and 33, the elongated contact cups such as cup 40 within housings 32 and 33, the extensions 12 and 13 and then back to pad 11.

The mechanical, pivotal connection is particularly formed in accordance with the present invention with the bearing structure 16 being interposed between extension 12 with a similar bearing for extension 13, and the con-

tact cup 40, and thus the housing 33 with an equivalent structure for housing 32. Therefore, an improved mechanical support which includes a bearing structure provides exceptionally relatively low friction, pivotal action without sacrificing an extremely effective electrical contact through the cooperating contact cup and stationary conductive extension.

Although I have described preferred embodiments of my novel invention, many variations and modifications will now be obvious to those skilled in the art, and I prefer, therefore, to be limited not by the specific disclosure herein but only by the appended claims.

I claim:

1. A hinge for pivotally connecting an elongated contact blade to a stationary conductive support structure; said hinge including a first and second clamp terminating in a first and second open housing respectively; said stationary conductive support structure including a first and second extending portion; said first and second extending portions supported within said first and second housings respectively; means electrically connecting said first and second housings to said first and second extending portions; said means including first and second contact support structures for maintaining high pressure circumferential engagement with said first and second housing extensions, respectively; a first and second bearing; said first and second bearings mechanically connected between said first and second extending portions and said first and second housings at respective locations axially displaced from the location of said circumferential contact engagement.

2. A hinge for pivotally connecting an elongated contact blade to a stationary conductive support structure; said hinge including a first and second clamp terminating in a first and second open housing respectively; said stationary conductive support structure including a first and second extending portion; said first and second extending portions supported within said first and second housings respectively; means electrically connecting said first and second housings to said first and second extending portions through respective contact means; a first and second bearing; said first and second bearings mechanically connected between said first and second extending portions and said first and second housings respectively; said first and second contact means including a first and second elongated contact cup secured to said first and second housings respectively, and first and second raised annular portions on said first and second extending portions respectively, and first and second biasing means circumferentially disposed about their respective ones of said contact cups for biasing said first and second contact cups into high pressure circumferential engagement with respect to said first and second raised annular portions of said first and second extending portions respectively.

3. A hinge for pivotally connecting an elongated contact blade to a stationary conductive support structure; said hinge including a first and second clamp terminating in a first and second open housing respectively; said stationary conductive support structure including a first and second extending portion; said first and second extending portions supported within said first and second housings respectively; means electrically connecting said first and second housings to said first and second extending portions; said means including first and second contact support structures for maintaining high pressure circumferential engagement with said first and second housing extensions, respectively; a first and second bearing; said first and second bearings mechanically connected between said first and second extending portions and said first and second housings at respective locations axially displaced from the location of said circumferential contact engagement; and sealing means for sealing said first and second housings about said first and second extending portions respectively.

4. An electrical switch; said electrical switch including a stationary portion and a pivotally rotatable portion; one of said portions having an extension; the other of said portions having a housing enclosing said extension; a bearing means located intermediate the end of said extension and said housing; said bearing means having a portion thereof connectable to an interior portion of said housing; and cooperating contact means in high pressure circumferential engagement between said housing and said extension for electrically connecting said extension and said housing during relative rotation between said extension and said housing on said bearing means.

5. An electrical switch; said electrical switch including a stationary portion and a pivotally rotatable portion; one of said portions having an extension; the other of said portions having a housing enclosing said extension; a bearing means located intermediate the end of said extension and said housing; said bearing means having a portion thereof connectable to an interior portion of said housing; and cooperating contact means in high pressure circumferential engagement between said housing and said extension for electrically connecting said extension and said housing during relative rotation between said extension and said housing on said bearing means; and means for sealing said housing from the external atmosphere; the location of said circumferential contact engagement axially separated from said bearing and sealing means, and spaced apart therefrom by a substantial portion of said extension in non-contact relationship with respect to said housing.

6. An electrical switch; said electrical switch including a stationary portion and a pivotally rotatable portion; one of said portions having an extension; the other of said portions having a housing enclosing said extensions; a bearing means located intermediate the end of said extension and said housing; said bearing means having a portion thereof connectable to an interior portion of said housing; and cooperating contact means in high pressure circumferential engagement between said housing and said extension for electrically connecting said extension and said housing during relative rotation between said extension and said housing on said bearing means; said cooperating contact means including an elongated contact cup electrically and mechanically connected to said housing and a raised circumferential portion on said extension engageable with the interior of said elongated contact cup about the circumferential thereof.

7. An electrical switch; said electrical switch including a stationary portion and a pivotally rotatable portion; one of said portions having an extension; the other of said portions having a housing enclosing said extensions; a bearing means located intermediate the end of said extension and said housing; said bearing means having a portion thereof connectable to an interior portion of said housing; and cooperating contact means extending between said housing and said extension for electrically connecting said extension and said housing during relative rotation between said extension and said housing on said bearing means; said cooperating contact means including an elongated contact cup electrically and mechanically connected to said housing and a raised circumferential portion on said extension engageable with the interior of said elongated contact cup about the circumference thereof; and biasing means extending about the exterior of said contact cup for biasing said contact cup toward circumferential engagement with respect to said extending circumferential portion of said extension.

8. An electrically conductive hinge; said electrically conductive hinge including a housing portion and an extension portion received by the interior of said housing portion; roller bearing means connected intermediate said extension portion and said housing portion for mechanically connecting said extension portion and housing portion in rotatable relationship with respect to one an-

other; the interior of said housing portion including elongated contact means; said elongated contact means and extension portion including cooperating circumferential surfaces; a biasing means about said elongated contact means; said biasing means biasing a predetermined portion of said elongated contact means into circumferential electrical engagement with said extension portion about said cooperating circumferential surfaces.

9. An electrically conductive hinge; said electrically conductive hinge including a housing portion and an extension portion received by the interior of said housing portion; roller bearing means connected intermediate said extension portion and said housing portion for mechanically connecting said extension portion and housing portion in rotatable relationship with respect to one another; the interior of said housing portion including elongated contact means; said elongated contact means and extension portion including cooperating circumferential surfaces; a biasing means about said elongated contact means; said biasing means biasing a predetermined portion of said elongated contact means into circumferential electrical engagement with said extension portion about said cooperating circumferential surfaces; the cooperating circumferential surface of said extension portion having a raised circumferential portion thereon for receiving said extended contacting means.

10. An electrically conductive hinge; said electrically conductive hinge including a housing portion and an extension portion received by the interior of said housing portion; roller bearing means connected intermediate said extension portion and said housing portion for mechanically connecting said extension portion and housing portion in rotatable relationship with respect to one another; the interior of said housing portion including elongated contact means; said elongated contact means and extension portion including cooperating circumferential surfaces; a biasing means about said elongated contact means; said biasing means biasing a predetermined portion of said elongated contact means into circumferential electrical engagement with said extension portion about said cooperating circumferential surfaces; the cooperating circumferential surface of said extension portion having a raised circumferential portion thereon for receiving said extended contacting means; and sealing means for sealing off an outer end of said housing and for sealing off an annular area at the other end of said housing at the area through which said extending portion enters said housing.

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