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Jakszt

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[54] **VOLTAGE OVERLOAD ARRESTER FOR HIGH-VOLTAGE SWITCHING SYSTEMS**

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[30] **Foreign Application Priority Data**

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[52] **U.S. Cl.** **317/62**; 317/65; 317/69; 317/71

[51] **Int. Cl.** **H02h 3/22**

[58] **Field of Search** ..... 317/65, 62, 70, 69; 315/36; 200/149 A

[56] **References Cited**

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[57] **ABSTRACT**

A high-voltage switching system voltage overload arrester of the type including a metallic arrester housing containing a gaseous insulating medium, spark gaps and voltage dependent discharge resistors coupled in series thereto, and an electrically nonconductive housing disposed within the arrester housing, in which the spark gaps and resistors, and another gaseous insulating medium, are disposed. The improvement comprises a conductive diaphragm disposed over at least one end of the nonconductive housing which is electrically coupled to the arrester housing and discharge resistors. The diaphragm is fastened to the nonconductive housing about the periphery thereof by means of a gas-impermeable metallic solder joint, and prevents the intermixture of the gaseous insulating mediums contained in the arrester and nonconductive housings.

3 Claims, 2 Drawing Figures

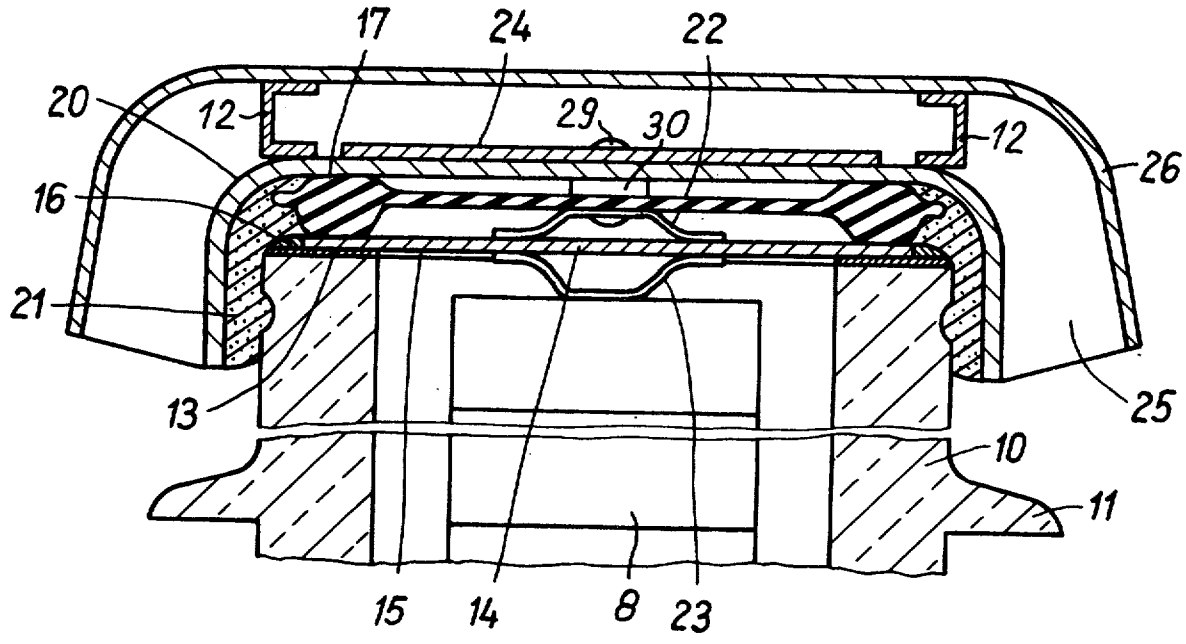


Fig. 1

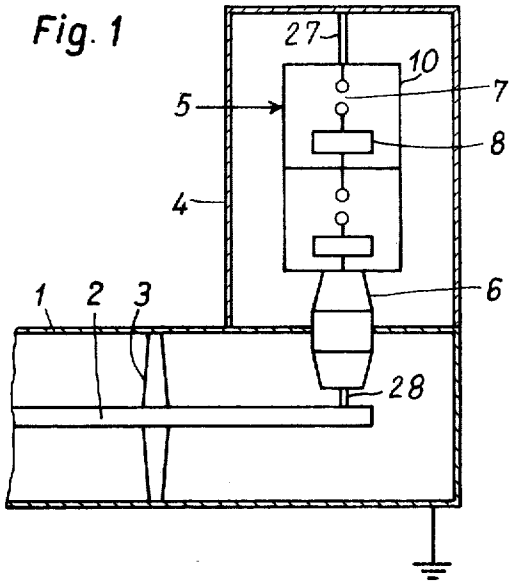
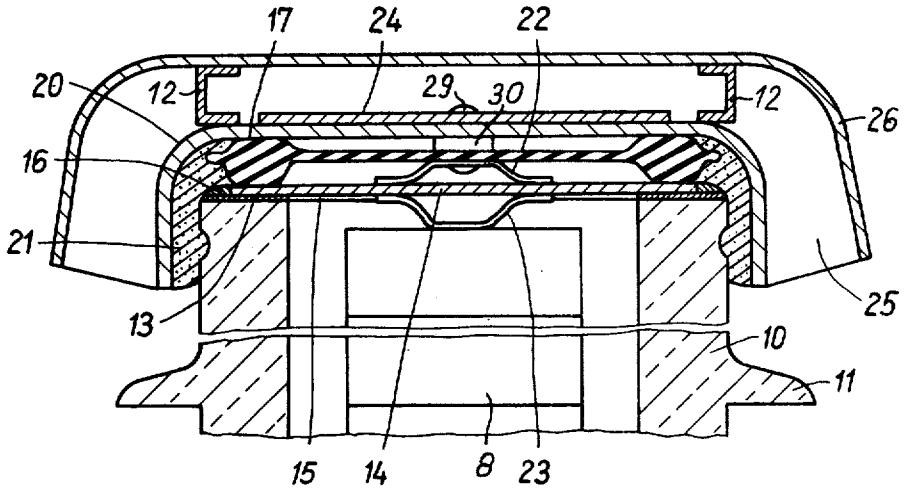

27
10
7
5
8
4
1
2
3
6
28

Fig. 2


17
24
22
20
12
29
30
12
26
16
21
25
13
10
11
15
14
8
23

VOLTAGE OVERLOAD ARRESTER FOR HIGH-VOLTAGE SWITCHING SYSTEMS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates generally to voltage overload arresters for high-voltage switching systems, and in particular, to an improved gas-impermeable housing for the components of such overload arresters.

2. Description of the Prior Art

High-voltage switching systems of the type utilizing metallic switching housings containing gaseous insulating mediums are generally protected from voltage overloads by arresting devices which are disposed either within the switching system housing or outside thereof, the latter type of which are generally connected to the switching system by electrically conductive feedthrough couplings. Problems are presented by installations of the latter type which use a gaseous insulating medium in the arrester housing which has a different dielectric strength than that utilized in the switching system housing. The gaseous atmosphere in the arrester housing must be maintained at a constant level to insure proper functioning of the spark gaps therein and a constant voltage response threshold level for the overload arrester. Optimum operation of the spark gaps of the arrester occurs in a gaseous insulating medium consisting of nitrogen, whereas optimum operation of the switching system occurs in an electronegative gaseous insulating medium having a higher dielectric strength, such as, for example, sulfur hexafluoride. In an arrester of the type in which the spark gaps and current discharge resistors thereof are contained in a separate, electrically nonconductive housing disposed within an outer metallic arrester housing connected to the switching system housing, the threshold response level of the arrester can be altered if the insulating gas contained in the switching system housing escapes into the nonconductive housing. It is thus desirable to provide a gas-impermeable nonconductive housing to prevent variations in the threshold response level of the arrester due to contamination of the gaseous insulating medium contained therein.

SUMMARY OF THE INVENTION

It is therefore an object of the invention to provide an improved voltage overload arrester for high voltage switching systems which overcomes the aforementioned disadvantages of heretofore known devices. This object is achieved by a high-voltage switching system voltage overload arrester of the type including a metallic arrester housing containing a gaseous insulating medium, spark gaps and voltage dependent current discharge resistors coupled in series thereto, and an electrically nonconductive housing disposed within the arrester housing in which the spark gaps and resistors are disposed. The improvement comprises a conductive diaphragm, electrically coupled to the discharge resistors and the arrester housing disposed over at least one end of the nonconductive housing and fastened thereto about the periphery of the diaphragm by a metallic gas-impermeable solder joint.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a cross-sectional view, in schematic form, of an improved high-voltage switching system voltage overload arrester constructed according to the invention; and

FIG. 2 is a partial, cross-sectional view of one end of the improved arrester constructed according to the invention.

It should be noted that the components of the arrester illustrated in FIG. 2 are not proportional in dimension and have been illustrated in enlarged form in order to simplify the drawings and the following detailed description.

DETAILED DESCRIPTION

Referring now to the drawings, in particular FIG. 1, there is shown a voltage overload arrester 5 comprising an electrically nonconductive annular housing 10 in which spark gaps 7 and voltage dependent current discharge resistors 8 coupled in series thereto are disposed. The structure and operation of the spark gaps and discharge resistors are known in the art and will therefore not be discussed herein. The spark gaps and resistors are coupled by means of a coupling conductor 27 at one end of housing 10 to a metallic arrester housing 4 in which a gaseous insulating medium, preferably sulfur hexafluoride, is disposed. Housing 10 preferably contains nitrogen gas. The other end of arrester 5 is coupled by a feedthrough coupling member 6 and another conductor 28 to a bus bar 2 disposed within a metallic switching housing 1 and supported on an electrically nonconductive member 3. Housing 1 is also preferably filled with sulfur hexafluoride gas as an insulating medium.

Referring now to FIG. 2, housing 10 of the arrester is constructed of electrically nonconductive material, such as, for example, porcelain, and includes radially outwardly extending rib members 11. Spark gaps 7 and resistors 8 are disposed within housing 10 and connected as illustrated in FIG. 1. A diaphragm 14, comprising a layer of metallic, electrically conductive material, is disposed over one end of housing 10 and is separated from the end face 13 thereof by a layer of metallic material 15. The diaphragm is fastened to housing 10 by means of a gas-impermeable solder joint 16 disposed about the periphery thereof. The diaphragm may comprise, for example, a layer of chrome-nickel steel which is approximately several tenths of a millimeter in thickness. Layer 15 may comprise a layer of silver formed by applying a paste containing silver metal to ceramic housing 10 and firing the paste at a high temperature to securely fasten the silver to the housing. The diaphragm is soldered by means of soft or hard solder to the metallic silver layer. If housing 10 is constructed of material other than procelain, such as organic insulating material, a metallic ring or metal fitting can be embedded into the housing by casting or other known methods when the latter is fabricated so that a suitable soldering surface is provided for fastening the diaphragm to the housing.

An annular rubber seal 17 is disposed on the other side of diaphragm 14 and separates a metallic cap 20, which is disposed over the end of housing 10 and is attached thereto by a cement joint 21, from the diaphragm. The cap and seal 17 press diaphragm 14 against metal layer 15 and end face 13 and additionally

secure the diaphragm on the housing. The arrangement also causes expansion of the diaphragm to be absorbed by friction so that solder joint **16** is not affected. Metallic cap **20** is electrically coupled to housing **4**, and to ground potential through housing **1**, by conductor **27** (not shown in FIG. **2**). Electrical contacts **22** and **23** are mounted on resistors **8** and seal **17** by suitable fastening means and electrically couple the diaphragm to the discharge resistors and housing cap **20**. A rivet **29** secures a conductive cover **24** to cap **20** which electrically couples contact **22** thereto.

The diaphragm also functions as a pressure relief mechanism for the arrester housing. Diaphragms have heretofore been used as pressure relief devices, but have merely been pressed against the end faces of arrester housings on an interdisposed sealing ring, and a gas-tight pressure resistant seal sufficient to function as described herein cannot be obtained. Cover **24** is fastened to cap **20** by rivet **29**, which is of the release type, and covers an opening provided in the cap for the escape of gas. If excessive pressure builds up in housing **10**, the resultant gas pressure ruptures diaphragm **14** and cover **24**. The gas escapes through nozzles **25** formed over cap **20** by a deflection plate **26** attached to the cap by mounting members **12**. It should be noted that although only one end of housing **10** has been illustrated as being sealed by the diaphragm arrangement described herein, the same seal may be provided at either or both ends of housing **10** to effect the required gas-tight sealing of the housing.

While there has been disclosed herein what is considered to be a preferred embodiment of the invention, it will be understood by those persons skilled in the art that many changes and modifications may be made thereunto without departing from the invention. It is therefore intended in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. In a high-voltage switching system voltage overload arrester, of the type including a metallic arrester housing containing a gaseous insulating medium, spark gaps and voltage dependent current discharge resistors coupled in series thereto, and an electrically nonconductive housing, containing another gaseous insulating medium, disposed within the arrester housing, in which the spark gaps and resistors are disposed, the improvement comprising a diaphragm comprising a layer of electrically conductive metallic material, electrically coupled to said arrester housing and discharge resistors, and disposed over at least one end of said nonconductive housing and fastened thereto about the periphery of said diaphragm by a metallic gas-impermeable solder joint, said solder joint comprising a layer of metallic material fastened to an end face of said nonconductive housing and solder material joining said diaphragm to said layer of metallic material; a rubber seal engaging said diaphragm; and a metallic cap, disposed over the endface of said nonconductive housing and secured thereto by a cement joint, and spaced apart from said diaphragm by said rubber seal.

2. The overload arrester recited in claim **1**, further comprising electrical contacts coupled to said discharge resistors and said cap and disposed in engagement with said diaphragm.

3. The overload arrester recited in claim **1**, further comprising a deflection plate, mounted on said cap and spaced apart therefrom so as to form nozzles therebetween, and a breakable, electrically conductive cover, fastened to said cap and disposed over an opening provided therein.

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