

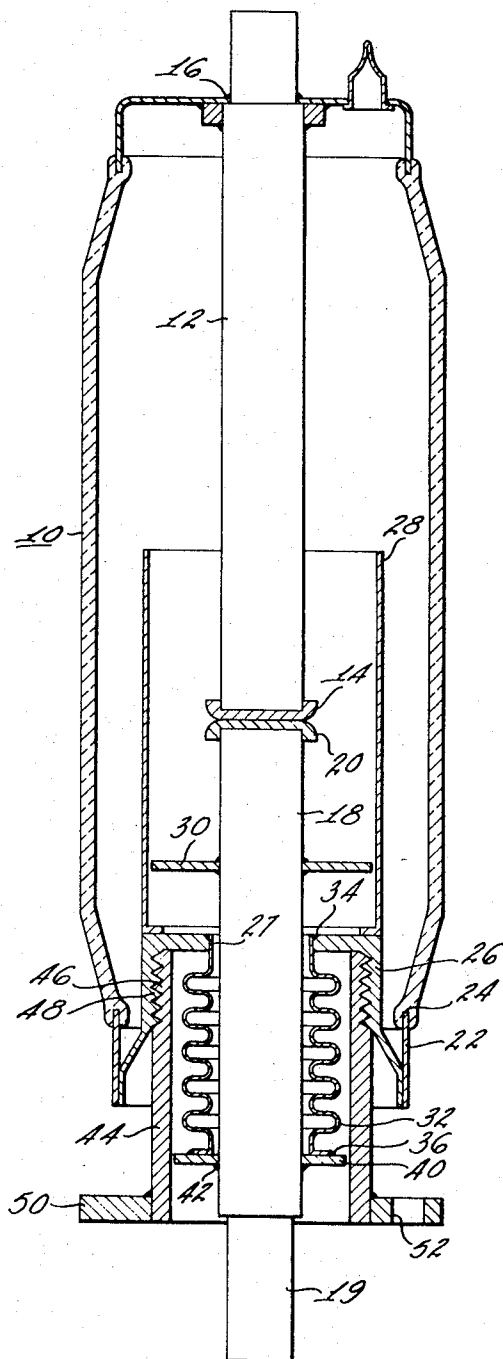
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H. J. WESOLOSKI

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REMOVABLE SHIELD MEANS FOR VACUUM SWITCH BELLOWS

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Inventor  
Henry J. Wesoloski  
By Thomas F. Kirby  
Attorney

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**REMOVABLE SHIELD MEANS FOR VACUUM SWITCH BELLOWS**

Henry J. Wesoloski, Milton, Mass., assignor to Allis-Chalmers Manufacturing Company, Milwaukee, Wis.

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2 Claims

**ABSTRACT OF THE DISCLOSURE**

A vacuum interrupter comprises a cylindrical glass envelope with an opening at one end. A first cylindrical metal ring is bonded to the envelope around the opening. A second cylindrical ring, internally threaded, is secured to the first ring and extends back into the envelope. A movable contact rod extends into the envelope through the opening. A cylindrical bellows surrounds the rod and extends beyond the glass envelope and the first ring. One end of the bellows is joined to the second ring inside the envelope and to the rod outside of the envelope. An externally threaded cylindrical shield attaches to the threads on the second ring and surrounds and protects the bellows. Flanged attachment means for the vacuum interrupter are provided on the shield.

This invention relates generally to electrical vacuum switches or circuit interrupters. More particularly, it relates to removable shield means for physically protecting flexible sealing members, such as bellows, used on vacuum switches.

One type of vacuum switch comprises a hollow envelope, usually of glass, having stationary and movable contact rods extending into the envelope. A flexible sealing member such as a bellows is arranged between the envelope and the movable contact rod to provide a vacuum tight connection therebetween while still permitting movement of the movable contact. Since the bellows is very fragile, it was practical to situate the bellows substantially within the end of the envelope to protect it against damage. However, this made the bellows relatively hard to get at for welding during manufacture of the switch, particularly when chill rings used for cooling during welding to protect other components were employed.

Accordingly, it is an object of the present invention to provide a vacuum switch in which the bellows are located in a more accessible position for welding during assembly or repair.

Another object is to provide improved means for sealing the opening between a vacuum switch envelope and the movable contact rod.

Another object is to provide improved means for shielding vacuum switch bellows against physical damage.

Another object is to provide improved bellows shielding means of the aforesaid character which also adapt the vacuum switch for mounting on a suitable supporting stud.

Another object is to provide a shield of the aforesaid character which is removable.

Other objects and advantages of the invention will hereinafter appear.

The accompanying drawing illustrates a preferred embodiment of the invention but it is to be understood that the embodiment illustrated is susceptible of modifications with respect to details thereof without departing from the scope of the appended claims.

In the drawing there is shown a cross sectional view of a vacuum switch embodying the present invention.

Referring to the drawing, the numeral 10 designates a

vacuum switch envelope which, for example, is made of glass but could be made of other materials. An electrically conductive stationary contact rod or contact support member 12 having a contact 14 thereon extends into one end of envelope 10 and is sealed thereto as at 16. An electrically conductive axially movable contact rod or contact support member 18 having a contact 20 thereon extends into the other end of envelope 10. Movable contact rod 18 has a portion 19 to which an electrical conductor and operating linkage can be connected.

Means are provided to form a vacuum tight seal between envelope 10 and movable contact rod 18. Such means comprise first metal ring 22 which has one end connected by a metal-to-glass seal, as at 24, to envelope 10. A second metal ring 26 is secured in vacuum tight connection to ring 22 as by welding. Ring 26 is provided with an aperture 27 for accommodating movable contact rod 18. If preferred, the rings 22 and 26 could be integrally formed of a single piece of metal. An arcing shield 28 is provided within envelope 10 and supported on ring 26 to prevent arcing products produced during contact separation from being deposited on the inside surface of envelope 10. A bearing washer 30 is supported within arcing shield 28 to guide and support movable contact 18. A flexible sealing member, such as a generally cylindrical corrugated bellows 32 has one end secured in vacuum tight connection, as by welding at 34, to ring 26. The other end of bellows 32 is secured in vacuum tight connection, as by welding at 36 and 38, to movable contact rod 18 and to a washer 40, respectively. Washer 40 is secured to rod 18 as by welding at 42.

In accordance with the present invention removable shield means 44, tubular in form, are provided to protect bellows 32, particularly that portion of the bellows which, in the absence of shield 44, would project beyond envelope 10 and the rings 22 and 26. Means are provided to removably attach shield 44 to envelope 10 and such means take the form of a threaded portion 46 on shield 44 and a corresponding threaded portion 48 on ring 26. Shield 44 is further provided with means, such as a flange 50 having mounting holes 52 therein, which adapt the vacuum switch for mounting on a suitable support (not shown).

As will be understood, shield 44 is not attached during manufacture until the various welds described herein have been made. Consequently, the welding gun has access to the areas where welds are desired. Furthermore, the absence of shield 44 permits chill rings to be temporarily placed in appropriate positions during welding to prevent the metal-to-glass seal 24 from being damaged by heat stress. Shield 44 is put in place as shown in the drawing only after all welds are made and the tube is evacuated and baked out. If preferred, a joint sealing compound such as "Locktite" can be used on the threaded portions of shield 44 and ring 26 to prevent the shield from working loose.

As will be further understood, shield 44 can be removed after manufacture to make repairs to bellows 32 or to any weld which so requires.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In a vacuum interrupter, an envelope having an opening, a tubular means sealed to said envelope at said opening and having a portion extending inside said envelope, connecting means on the inside of said tubular means at said portion thereof which extends inside said envelope,
- a movable contact support member extending into said envelope through said opening and having a portion extending outside of said envelope,

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a tubular corrugated bellows surrounding said member and having a portion outside of said envelope, said bellows connected to the portion of said tubular means inside said envelope and connected to the portion of said contact support member outside of said envelope, 5  
 a detachable tubular shield surrounding at least the portion of said bellows outside of said envelope, said shield having connecting means on the exterior thereof for engaging with the connecting means on said tubular means, 10  
 and means on said shield for connecting said vacuum interrupter to a support.  
 2. In a vacuum interrupter,  
 an envelope of insulating material and having an opening, 15  
 a first ring having one end sealed to said envelope and extending outwardly therefrom,  
 a second ring which extends inside said envelope and has one end sealed to the other end of said first ring, 20  
 threaded connecting means on the inside of said second ring at the portion thereof which extends inside said envelope,  
 a movable contact support member extending into said envelope through said opening and having a portion ex- 25

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tending outside of said envelope beyond the other end of said first ring,  
 a tubular corrugated bellows surrounding said contact support member and having a portion outside of said envelope beyond the other end of said first ring, said bellows connected at one end to the other end of said second ring inside said envelope and connected at its other end to a portion of said contact support member outside of said envelope beyond the other end of said first ring,  
 a detachable tubular shield surrounding said bellows and extending beyond the other end of said first ring, 5  
 threaded connecting means on the exterior of said shield for engaging with the threaded connecting means on said second ring, 10  
 and flange means on said shield for connecting said vacuum interrupter to a support.

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ROBERT S. MACON, *Primary Examiner.*