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SHUNTING DEVICE

Filed Feb. 1, 1960

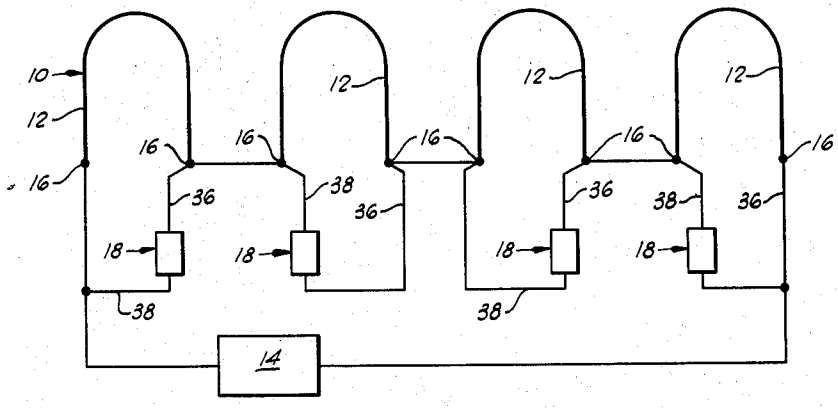


Fig. 1

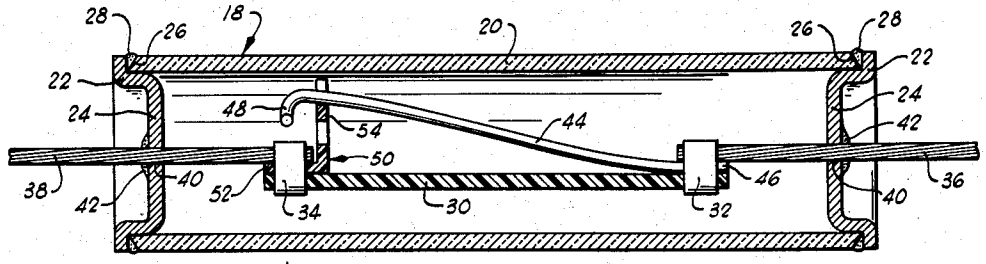


Fig. 2

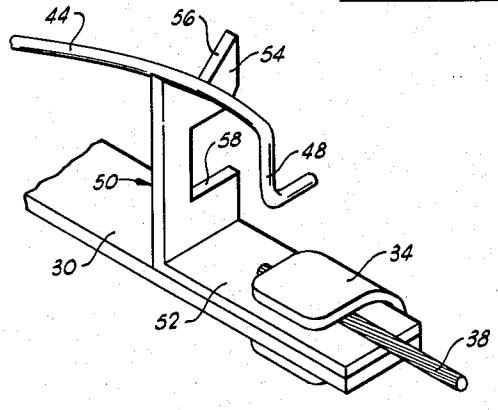


Fig. 3

INVENTOR.
FREDERICK I. LOVRET
BY Jerry J. Dunlap
ATTORNEY

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SHUNTING DEVICE

Frederick I. Lovret, Norman, Okla., assignor to L & M Space Research and Electronics Corporation, Norman, Okla., a corporation of Oklahoma

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This invention relates generally to improvements in devices for automatically shunting the current around an open or broken electrical circuit, and is particularly useful in shunting the current around a broken neon tube.

As it is well known in the Neon sign industry, a plurality of neon units are frequently connected in series to a common power source, usually a transformer. Each neon unit is defined as a single length of neon tube having electrodes in the opposite ends thereof, and this single neon tube is normally shaped to form only a portion of a complete Neon sign. When the tube of a neon unit is broken, or when the unit becomes faulty for any reason, the entire circuit in which the unit is interposed in broken, and the entire sign will be turned off.

Several different designs of devices for shunting the current around a neon unit have been proposed, but none of these prior devices have been widely accepted in the industry. These prior shunting devices have operated on the principle of a fuse wherein arcing is created between a fuse member and a contact when a neon unit is broken to sever the fuse member and allow engagement of a pair of contacts. The fuse member is ordinarily used in the nature of tension spring to retain a movable contact in spaced relation from a stationary contact, which requires a complicated and expensive manufacturing operation.

The present invention contemplates a novel shunting device which may be easily and conveniently connected across any type of neon unit and will quickly short-circuit the neon unit in the event the neon unit becomes faulty. The present invention contemplates the use of a spring-loaded conductor held in arcing relation with respect to a contact by a thermo-plastic spacer in such a manner that the spring-loaded conductor becomes heated upon arcing between the conductor and contacts to, in effect, melt the thermo-plastic spacer and allow direct engagement of the spring-loaded conductor with the contact. The spring-loaded conductor, associated contacts and spacer may be easily mounted in a closed tube to prevent the entrance of dirt or other foreign matter in the space between the spring-loaded conductor and the contact, and the entire device may be assembled in the most economical and convenient manner.

In its broader aspects, the present invention may be defined as a device for shunting a faulty neon unit or the like having a pair of spaced electrodes, comprising a non-conducting support, a pair of contacts mounted in spaced relation on the support, a first lead secured to one of said contacts for connection with one of the neon unit electrodes, a second lead secured to the other of said contacts for connection with the other neon unit electrode, a spring-loaded conductor having one portion thereof secured to one of said contacts and having another portion thereof biased toward the other of said contacts, and a non-conducting thermo-plastic spacer carried by said support and engaging said conductor for retaining said other portion of said conductor an arcing distance from said other contact, said spacer being responsive to heating of said conductor resulting from arcing between said conductor and said other contact to release said conductor for movement into engagement with said other contact.

An important object of this invention is to provide an efficient shunting device for faulty neon units and the like

which may be easily connected across any size or type of neon unit and which will efficiently shunt the neon unit when the neon unit is broken or otherwise becomes non-conducting.

Another object of this invention is to provide a device for shunting a faulty neon unit or the like which may be easily designed for any desired power requirements.

A further object of this invention is to provide a shunting device which may be installed in an exposed position and will not be rendered inoperative by the action of weather.

Another object of this invention is to protect a complete Neon sign against interruption of current through the sign for an extended period of time.

Another object of this invention is to provide a shunting device utilizing the simplest fastening devices and which requires no fuse element held under tension.

A still further object of this invention is to provide a shunting device which is simply constructed, may be economically manufactured and which will have a long service life.

Other objects and advantages of the invention will be evident from the following detailed description, when read in conjunction with the accompanying drawings which illustrate my invention.

In the drawings:

FIGURE 1 is a schematic wiring diagram illustrating the connections, in a Neon sign, of a plurality of shunting devices constructed in accordance with this invention.

FIGURE 2 is a longitudinal sectional view through a shunting device constructed in accordance with this invention.

FIGURE 3 is an enlarged perspective view showing the construction of the thermo-plastic spacer and the position of the spring-loaded conductor in arcing position.

Referring to the drawings in detail, and particularly FIG. 1, reference character **10** generally designates a complete Neon sign comprising a plurality of neon units **12** connected in series with a suitable power source **14**, such as a transformer. Each neon unit **12** is provided with an electrode **16** at each end thereof, and each pair of electrodes **16** may be positioned an appreciable distance apart, depending upon the configuration of the respective neon unit **12**. It will be understood that each neon unit **12** will normally comprise one or more letters of a complete sign, or some portion of a design of a complete Neon sign. In accordance with this invention, a shunting device **18** is preferably connected across the electrodes **16** of each neon unit **12** of the sign **10**.

As shown in FIG. 2, each shunting device **18** comprises a tube **20** of any suitable non-conducting material, such as glass, and end plates **22** sealed to the opposite ends of the tube **20**. In a preferred construction, each end plate **22** is in the form of a washer having the central portion **24** thereof dished inwardly at a diameter corresponding to the inner diameter of the tube **20** to facilitate the insertion of the end plates **22** into the opposite ends of the tube **20**, as illustrated in the drawing. Also, each end **26** of the tube **20** is preferably beveled or tapered away from the respective end plate **22** to form an annular chamber around each end of the tube **20** between the tube **20** and the outer portion of the respective end plate **22** for reception of a sealing material **28**. The sealing material **28** may be of any type which will provide an air-tight seal between the end plates **22** and the ends of the tube **20**, and may be, for example, a product named Acryloid B–7, manufactured by Cadillac Manufacturing Co. of Dallas, Texas. It may also be noted that each end plate **22** may be formed out of any suitable material which is easily shaped into a dished configuration as illustrated in the drawing, and may be, for example, brass.

A support member **30** of non-conductive material, such

as a plate of mica, is positioned in the central portion of the tube **20**. It will also be observed that the support member **30** has a length less than the length of the tube **20**. A pair of contacts **32** and **34** are mounted in spaced relation on the support member **30** and are suitably secured in conducting relation with a pair of leads **36** and **38**. Each of the leads **36** and **38** preferably comprises a length of stranded wire to facilitate the connection of the leads across the electrodes **16** of the respective neon unit **12** in the manner illustrated in FIG. 1. Each of the leads **36** and **38** extends through an aperture **40** formed in the central portion of the respective end plate **22** of the device **18** and is soldered to the respective end plate by solder **42**, such that the support member **30** will be secured in a fixed position in the tube **20** and the leads **36** and **38** may be easily connected to the electrodes **16** without possible damage to the elements contained within the tube **20**.

A spring-loaded conductor **44** is secured to one of the contacts **32** at one end **46** thereof and extends generally toward the other contact **34**. In a preferred construction, the conductor **44** is in the form of a spring wire with the end **48** thereof bent toward, and then transversely with respect to, the contact **34**, as most clearly shown in FIG. 3. The conductor **44** is sprung away from the support **30** and held with the end **48** thereof in spaced relation from the contact **34** by a spacer **50** formed of a suitable thermo-plastic material which will either melt or become extremely plastic when heated by the conductor **44**, such as Acetate Butyrate, sold by Chicago Molding Co. of Chicago, Illinois. The spacer **50** is preferably in the form of a plate bent to provide flange portions **52** and **54** extending at right angles to one another. The flange portion **52** is positioned in contact with the support member **30**, and the flange portion **54** extends outwardly from the support member **30** into engagement with the conductor **44** adjacent the end **48** thereof. Also, as shown in FIG. 3, a V-shaped notch **56** is preferably provided in the outer end of the flange portion **54** to retain the conductor **44** in alignment with the contacts **32** and **34** when the conductor is in the position shown in FIGS. 2 and 3. A slot **58** is provided in one edge of the flange portion **54** extending between the conductor **44** and the support member **30** to facilitate the ease of movement of the conductor **44** when the spacer **50** becomes heated. In other words, the slot **58** controls the strength of the spacer **50** in an economical and efficient manner.

In a preferred embodiment of this invention, each of the contacts **32** and **34** is in the form of a U-shaped cleat which is placed around the respective portion of the support **30** and then pressed together over the respective lead **36** or **38** to provide an efficient engagement of the contacts with the leads. Also, the end portion **46** of the conductor **44** is placed between the opposite sides of the contact **32** in contact with the lead **36** prior to the pressing of the contact **32**, to rigidly secure the end portion **46** of the conductor **44** to the support member **30**. The opposite contact **34** is extended over the flange portion **52** of the spacer **50**, as well as over the lead **38**, to rigidly support the spacer **50** in the desired position.

When one of the devices **18** is connected across the electrodes **16** of each of the neon units **12** in the manner illustrated in FIG. 1, the distance between the end **48** of the conductor **44** and the contact **34** will be less than the distance between the electrodes **16** of the respective unit **12**. Therefore, when the tube of the respective unit **12** breaks, or when the unit **12** becomes non-conducting for any reason, an arc will occur between the end **48** of the conductor **44** and the contact **34** which heats the conductor **44**. Heat dissipated by the conductor **44** will either melt the thermo-plastic spacer **50** or will render the thermo-plastic spacer **50** highly plastic, such that the conductor **44** will spring toward the support member **30** over or through the flange portion **54** of the spacer and bring the end **48** of the conductor into engagement with the contact **34**; whereupon current will flow through the device **18** to short-circuit or shunt the respective neon unit **12**. It will be apparent that the size of the spacer **50** and the configuration of the conductor **44** may be designed to position the end **48** of the conductor from the contact **34** a distance which will provide an arcing between these two points when the neon unit **12** becomes faulty, without affecting the normal operation of the neon unit **12**.

From the foregoing it will be apparent that the present invention provides a novel shunting device which will provide adequate protection for a complete Neon sign and prevent the complete sign from going out in the event one of the units of the sign is broken or the like. The present shunting device is usable on any Neon sign construction and will be unaffected by adverse weather conditions, as well as be protected against the entrance of dirt or other foreign matter between the working parts of the device. It will also be apparent that only two fasteners are required for the working parts of the device, and these fasteners are preferably in the form of simple U-shaped cleats which also function as contacts to provide the most economical construction. Finally, it will be apparent that the present shunting device will have the maximum service life, until it is energized by a faulty neon unit, is simple in construction and may be economically manufactured and used.

Changes may be made in the combination and arrangement of parts or elements as heretofore set forth in the specification and shown in the drawings, it being understood that changes may be made in the precise embodiment disclosed without departing from the spirit and scope of the invention as defined in the following claims.

I claim:

1. A device for shunting a faulty neon unit or the like having a pair of spaced electrodes, comprising a non-conducting support, a pair of contacts mounted in spaced relation on the support, a first lead secured to one of said contacts for connection with one of the neon unit electrodes, a second lead secured to the other of said contacts for connection with the other neon unit electrode, a spring-loaded conductor having one portion thereof secured to one of said contacts and having another portion thereof biased toward the other of said contacts, and a non-conducting thermo-plastic spacer connected to said support by said other contact and engaging said conductor for retaining said other portion of said conductor an arcing distance from said other contact, said spacer being responsive to heating of said conductor resulting from arcing between said conductor and said other contact to release said conductor for movement into engagement with said other contact.

2. A device as defined in claim 1 wherein said conductor is in the form of a spring wire having a length slightly greater than the distance between said contacts, one end of said wire being secured to the said one contact and the opposite end portion of said wire being bent toward said other contact when the wire is held by said spacer.

3. A device as defined in claim 2 wherein said support is in the form of an elongated plate, each of said contacts comprises a U-shaped cleat pressed around a portion of said plate and the respective lead, and said cleat forming said one contact also being pressed over said one end of said wire.

4. A device as defined in claim 3 wherein said spacer is in the form of a plate bent to form two flange portions extending at right angles to one another, one of said flange portions being extended through the cleat forming said other contact and the other flange portion extending outwardly from said support into contact with said spring wire.

5. A device as defined in claim 4 wherein said flange portion extending into contact with said spring wire has

its outer end V-shaped to hold such spring wire in alignment with said contacts, and has a slot in one side thereof extending between said spring wire and said support.

6. A device for shunting a faulty neon unit or the like having a pair of spaced electrodes, the device comprising: a non-conducting elongated support; a first lead, an elongated spring-loaded conductor, and a first contact comprised of a U-shaped cleat, the first lead and one end of the conductor being clamped to one end of the support by the first contact; and, a second lead, a thermo-plastic spacer, and a second contact comprised of a U-shaped cleat, the second lead and the thermo-plastic spacer being clamped to the other end of the support by the second contact; the spring-loaded conductor having the other end biased toward the second contact and held in spaced, arcing relation therefrom by the thermo-plastic

spacer whereby a high voltage applied to the leads will cause arcing across the space between the spring-loaded conductor and the second contact; the thermo-plastic spacer being responsive to heating of said conductor resulting from the arcing to release the conductor for movement into engagement with the second contact to complete a shunting circuit.

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