Sept. 1, 1953 S. C. MILLER 2,651,024

COLD CATHODE ILLUMINATING ASSEMBLY AND INSULATOR HOUSING THEREFOR

Filed Jan. 31, 1950 2 Sheets-Sheet 1

Fig. 1.

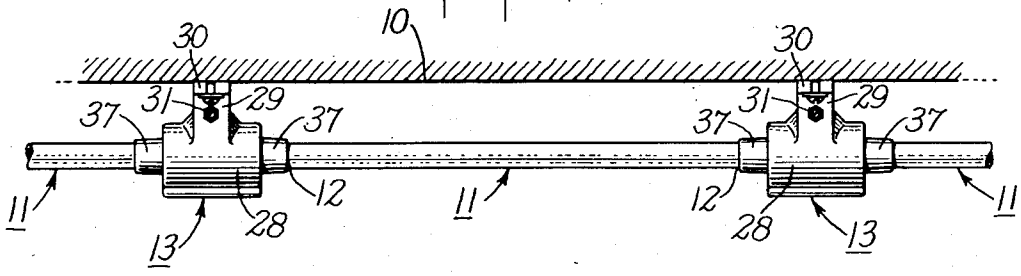


Fig. 2.

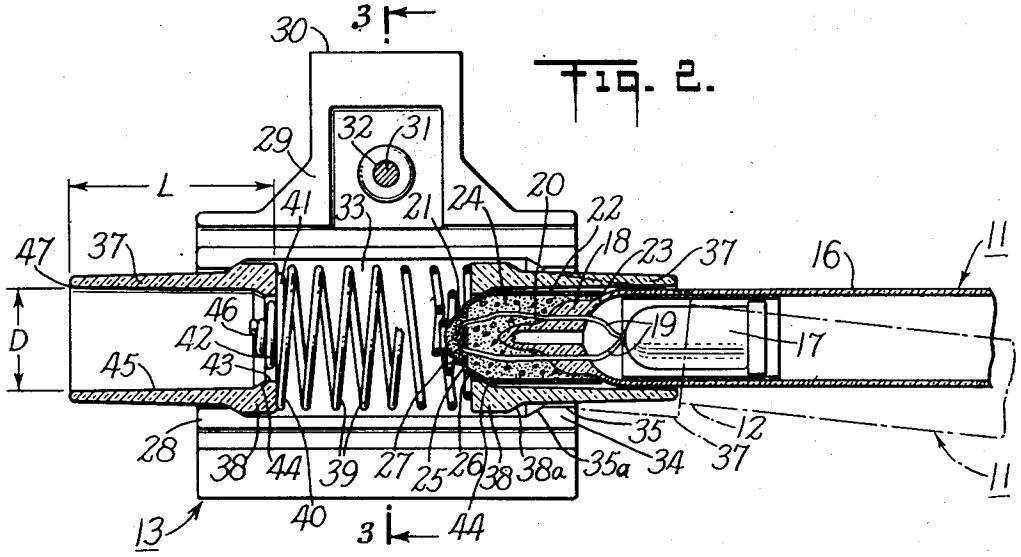
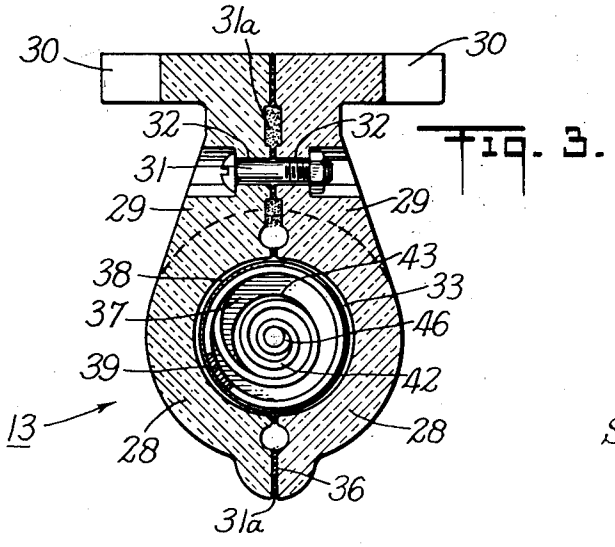


Fig. 3.



INVENTOR
Samuel C. Miller
BY
J. J. Basseches
his ATTORNEY

Sept. 1, 1953 S. C. MILLER 2,651,024

COLD CATHODE ILLUMINATING ASSEMBLY AND INSULATOR HOUSING THEREFOR

Filed Jan. 31, 1950 2 Sheets-Sheet 2

Fig. 4.

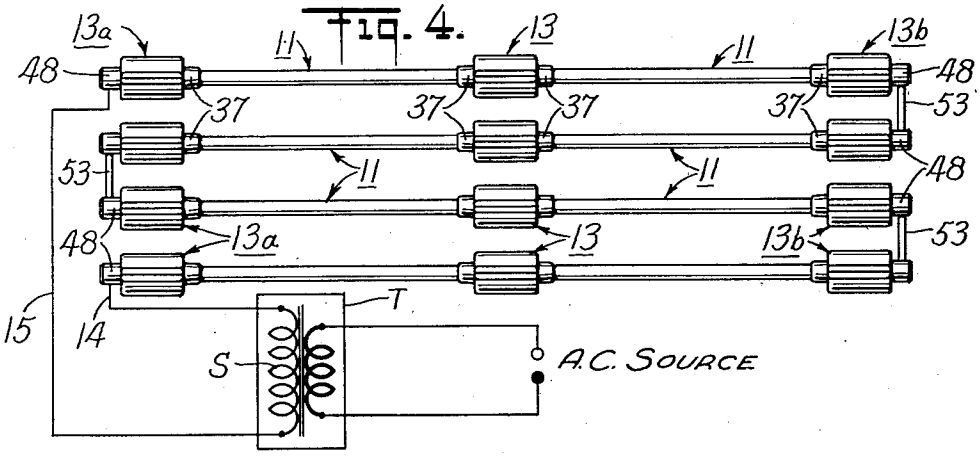


Fig. 5.

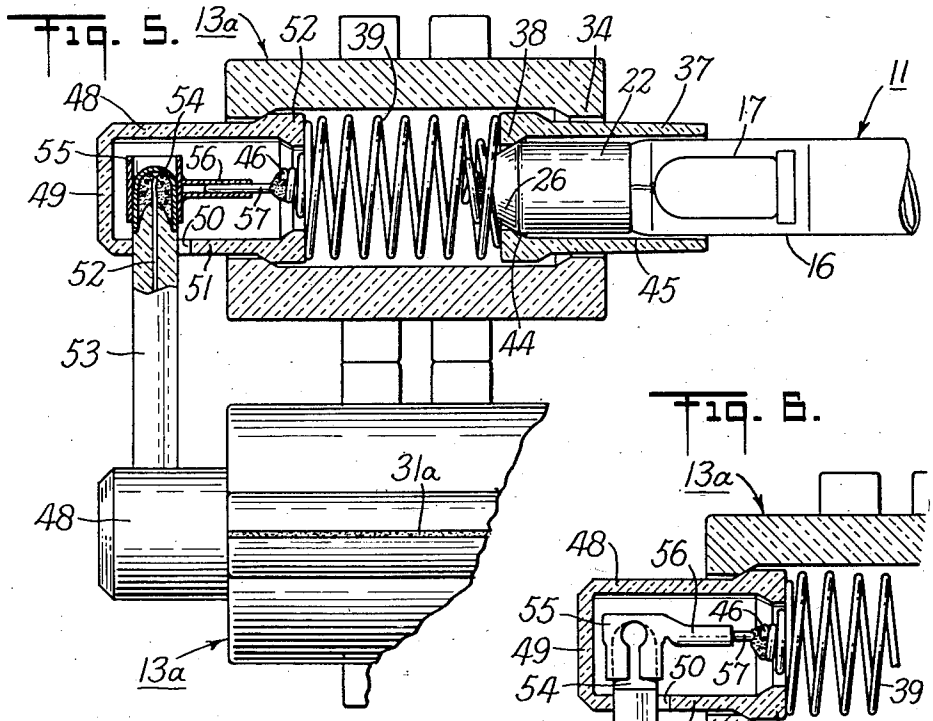
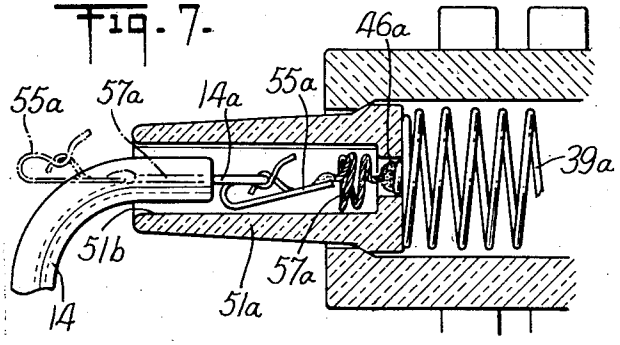


Fig. 6.

Fig. 7.



INVENTOR
Samuel C. Miller
BY
H. Bassecches
his ATTORNEY

Patented Sept. 1, 1953 2,651,024

UNITED STATES PATENT OFFICE

2,651,024

COLD CATHODE ILLUMINATING ASSEMBLY AND INSULATOR HOUSING THEREFOR

Samuel C. Miller, New York, N. Y.; Rosalie E. Miller, executrix of said Samuel C. Miller, deceased

Application January 31, 1950, Serial No. 141,377

1 Claim. (Cl. 339—55)

1

This invention relates to cold cathode illuminating assemblies, and more particularly to electrode housings for cold cathode tube illuminants which may be used in electric signs and illuminating installations.

This application is a continuation-in-part of my application Serial No. 77,014, filed February 17, 1949, now abandoned.

It is an object of my invention to provide an insulator housing for supporting the illuminating tubes employed in neon sign installations or in illuminating systems interiorly or exteriorly and which operate under high potential as compared with interior illuminating voltages or house voltages.

It is more specifically an object of my invention to provide insulator housings which in spaced positions serve as the means of conducting the source of power to the terminal ends of gas-filled tubular illuminants, to arrange a bank or series of such illuminants for connection with the source of electrical power.

It is contemplated by my invention to provide a housing which will minimize the hazards of shock in coupling or uncoupling the illuminants of tubular construction with the insulator housings for making electrical contact therewith and to provide insulation, without blocking off too much of an effective illuminating length of the tubular illuminant by the use of rather opaque material of which the insulation is made.

It is specifically contemplated by my invention to provide an insulator housing to be positioned at spaced points for connecting the terminal ends of gas-filled tubular illuminants with the source of power or with other similar tubes in a series connection, which are of minimum size, to minimize obscuring the effective illuminating area of the tube and yet comply with recognized safety requirements with regard to accessibility to "live" contacts where they may be accidentally reached by individuals who may make replacement or those engaged to maintain the illuminants in service.

To attain these objects and such further objects as may appear herein, or be hereinafter pointed out, I make reference to the accompanying drawing forming a part hereof, in which—

Figure 1 is a fragmentary side elevation illustrating an installation in accordance with my invention;

Figure 2 is a magnified section of the housing;

Figure 3 is a section taken on the line 3—3 of Figure 2;

Figure 4 is a diagrammatic plan view showing

2

a method of assembling a bank of gas-filled tubular illuminants employing the housings in accordance with my invention;

Figure 5 is a magnified longitudinal fragmentary sectional view of a pair of intermediate housings, coupled at one side of the bank of illuminants;

Figure 6 is a sectional view of a terminal housing employed in the bank;

Figure 7 is a sectional view of a terminal housing in accordance with another embodiment of my invention.

The invention may be summarized as concerning itself with supplying novel housings for use with high voltage illuminants in which electric potentials of 750 to 1000 volts and over are employed, and wherein the illuminant in the form of an unusually extended length is supported at its opposite ends with a gaseous discharge electrode as a contact. In view of its unusual length in relation to the diameter and complete enclosure at the contacting end, the illuminant is positioned by insertion in the housing with a tilting movement at one end and retraction for support on the other end. The invention provides a socket in which a safe relationship is maintained between the diameter of the socket and the depth through said socket to a contact, permitting a tiltable movement in inserting and removing the illuminant, with minimum screening of the useful illuminating area of the tube.

Making reference to the drawing, it is contemplated by my invention to provide some supporting surface, such as the wall or ceiling 10 with illuminants 11, the ends 12 whereof are supported in spaced housings 13, to arrange a plurality of such illuminants in series or in banks thereof, as more particularly exemplified in Figure 4.

In such assembly the intermediate housings 13 are interposed between terminal housings 13*a* and 13*b*. Conductors 14 and 15 connect terminal housings to the secondary S of a transformer T whereby cold cathode illumination at voltages in the neighborhod of 750 volts or higher may be furnished to the illuminants 11. It will be understood that other tubular gaseous discharge devices may be used with the housings hereinafter illustrated. The assembly illustrated shows a series connection of a plurality of such illuminants, each of which, in general, in accordance with the field to which this invention applies includes a glass envelope 16, having sealed-in electrodes 17 by means of the fused pedestal 18, crimped about the leads or pigtails

19. The pigtails extend exteriorly of the seal at 20 and are soldered or otherwise electrically connected at 21 to a cap 22.

In accordance with the present embodiment, the cap 22 is a generally cylindrical cup-shaped element whose open mouth 23 closely fits the glass envelope 16 and fixedly embraces the terminal end of the tube by cement, such as plaster of Paris or moulten shellac 24. The base 25 of the cap 22 is shaped to provide a constricted end having tapering sides 26 generally of frustoconical configuration and a contacting end 27.

Tubular illuminants of this character, filled with gas in a well known manner, may be employed with the socket 13 comprising twin segments 28, 28 having standard or upright portions 29 and laterally extending ceiling or wall engaging brackets 30 through which usual fastening means such as lag screws may be used for attachment. These segments may be joined by a cross bolt 31, extending through complementarily positioned apertures 32, having a counterboring of a size to receive the usual head and nut of the cross bolt. A layer of porcelain type cement 31*a* is added to the contacting faces of the segments to join the same, and these are formed with grooves to restrain the excess from running into the functional portions of the socket. The main body portion of each complementary segment of the housing is longitudinally formed with a semi-cylindrical cavity 33, the rim ends of which are constricted by having an inwardly directed flange 34, a couple of which serve to define the rim 35 extended from the flared throat 35*a*. A pair of such housing segments, when brought together by the bolt 31 previously described at the meeting edge 36 of the segments may house the floating collars 37, each of which collars has the sleeve portions cylindrical to fit the mouth defined by the rim 35 to the socket formed by the cavities 33 in each segment. An outwardly directed flange 38, having a graduated neck 38*a* restrains the collar from outward projection by a coiled contact spring 39, while still permitting a tilting movement thereof with relation to the rim 35. The spring 39 is generally spirally helically formed along its length and has its termini 40 formed with spirally directed winding to provide an independently effective peripheral biasing convolution 41 and an axial convolution contact 42. The axial convolution contact may project slightly through the aperture 43 adjacent the conical seat 44 of the boring 45 of the collar. Normally, for intermediate housings, the spring 39 is employed to project opposed collars in each housing adjacent the flanges 34. Each boring 45 of the collars is shaped to receive the tube 16 and a cap 22 in relatively snug sliding engagement and to seat the conical portion 26 upon the seat 44 of the collar, to project the terminal end 25 into contacting engagement with the convolution 42.

A snug engagement provides for a safe arrangement of the mouth of the collar with relation to the live contact 42 but requires that the collar and tube are substantially coaxially aligned before seating the latter into the collar or socket thereof.

In accordance with my invention, when a tube 11 is positioned between spaced pairs of housings 13—13, the tubes 11 may be sleeved within the collars, there being a spacial distance between housings 13—13 so that one end 12 may first be tiltably sleeved into a collar; then, by pressing the collar telescopically within the housing, moving it to a coaxial position with regard to the opposed socket and then nesting the opposed end 12 into the complementary socket. The extension of the spring 39 will press the collar against the base 26 of the cap and seat the tube at its opposite end coaxially aligned within the sockets.

In accordance with my invention, the boring 45 is arranged to have its diameter D in a predetermined ratio to the length L which is the distance from the seat 44 to the lip 47, so that the length L is one fourth (¼) to two (2) times longer than the diameter D. The telescopic and tiltable location of the collar with relation to the aperture defined by the inwardly turned flange 35 and throat 38*a* permits of an arrangement whereby a rather snug fit may be retained between the tube 16 and collar 37, to have the mouth 47 of an extended shielding distance from the seat 44 and to provide for the extensiveness of the housing occupied by the expansion spring 39 to where it is minimized. The spring 39 however is large enough to permit tiltable and retracting placement of the tube ends to coaxially bring the tube into seating position with the cooperating contacts furnished by the last convolution in each socket. This arrangement is possible without affording a hazardous accessibility of these contacts as the contact 46, projecting adjacent the aperture 43, is sufficiently spaced from the lip 47 to minimize normal finger contact which may cause electrical shock of one engaged in effecting replacement or repair.

It will thus be observed that by providing a tiltable and floating collar having a seat for the terminal end of the gaseous discharge tube, the collar serves as a safety closure for the conducting elements within the insulating housing as well as to provide a restricted shielding aperture through which the tube contact may be urged. Yieldability for tiltably positioning and coaxially supporting each tube with its ends overlapped by the insulation of the housing is possible, without unduly enlarging the insulating housing, as would be the case with rigid unitary housings. The hazard of exposed or readily accessible contacts, without great loss of luminous surfaces, is therefore minimized.

The housings in spaced positions as described by me may be used to support the adjacent ends of adjacent tubes. Where it is desired to arrange a large number of such tubes in series, I may provide one terminal end of a bank with a socket, such as 13*a*, in which a thimblelike plug 48 is closed at its end 49, and has an aperture 50 in the side wall 51. The base 52 in all other respects corresponds to the structure described in connection with the embodiment illustrated in Figure 2. Adjacent terminal housings 13*a* may be thus joined by a conductor 52*a* which may be sleeved in a ceramic tube 53, to have the ends thereof capped by the conductor cap 54. A spring clip 55 of generally cylindrical contour may receive the cap 54. The clip 55 has an extension ear 56 supporting a contact finger 57 for making electrical contact with the terminal 46 of the spring 39 as in the prior embodiment.

It will be understood that while a pair of the spaced terminal housings 13*a* may be joined by the conductor 52*a*, the plug 48 may serve as the means for forming a connection to the ends of cables 14 and 15 leading to the transformer T, as previously mentioned.

In Figure 7 I have illustrated another embodiment of a housing for connection of the cable ends leading from the transformer to a terminal

housing. The housing 13*a* is constructed as previously described and has the combined helical and spiral spring 39*a* outwardly spring-pressing a shielding collar 51*a*. In this form of construction the terminal contact end 46*a* has soldered thereto the conductor 57*a* which carries at its free end a clip 55*a* which will be recognized as a Fahnstock clip. The collar 51*a* follows the general construction of the collars 37 previously described, except that the boring 51*b* more closely conforms to the cable but is large enough to receive the Fahnstock clip 55*a*. For attachment of the original assembly, the Fahnstock clip 55*a* is withdrawn, as shown in dotted lines in Figure 7, the cable terminus 14*a* being attached, and then packed back within the boring 51*b*, there being sufficient friction to hold the conductor parts of the cable shielded within the collar 51*a*.

It will thus be observed that I have provided a housing and installation which maintains a high order or efficiency for illumination, as well as minimizing the hazard of electrical shock in operating on the high voltages required for operation of the illuminants mentioned.

It will also be observed that by my construction no unusual labor is involved in the sealing of the electrode end of the gaseous discharge tube to thereby achieve the minimum amount of blocking off of the illuminating area.

Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent is—

A housing made of insulating material having a socket, the socket being closed by a loose fitting collar, said collar having a conical seat at its inner end within the socket and having its walls formed exteriorly to provide a graduated neck extending into the socket and which is loosely, tiltably, telescopically slidable therein, stop means comprising a flange at the mouth of the socket and an outwardly directed flange on the collar interlocking the housing and collar, an expansion spring having an axial convolution providing a terminal contact and an outer convolution engaging the collar, and together providing a resilient extension shielding the contact and providing a resilient set, said collar having an axial bore through which the axial convolution of said spring extends.

SAMUEL C. MILLER.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,869,365	McClelland	Feb. 7, 1933
1,903,493	Beck et al.	Apr. 11, 1933
2,082,986	Staley	June 8, 1937
2,237,362	Rieman	Apr. 8, 1941
2,306,686	Chegwidden	Dec. 29, 1942
2,375,807	Miller	May 15, 1945
2,406,145	Holmes	Aug. 20, 1946
2,412,826	Mills et al.	Dec. 17, 1946