Oct. 29, 1940. S. C. MILLER 2,219,327

HIGH TENSION SIGN INSULATOR AND ATTACHING MEANS THEREFOR

Filed Oct. 5, 1936 3 Sheets-Sheet 1

Fig. 1

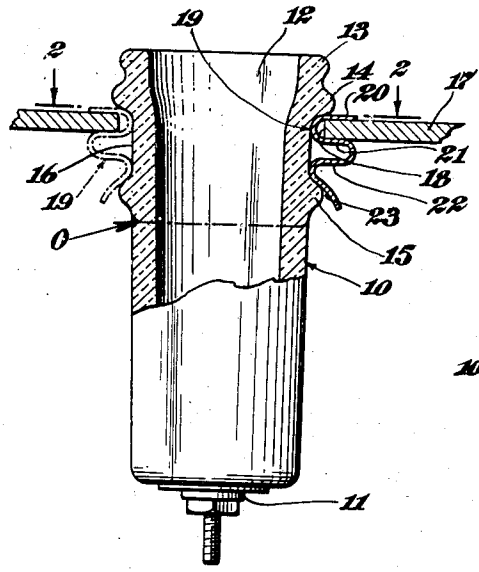


Fig. 2

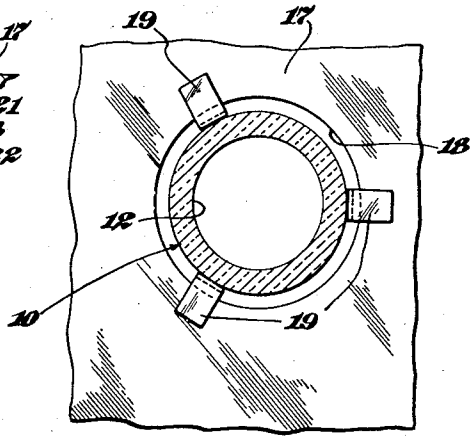


Fig. 3

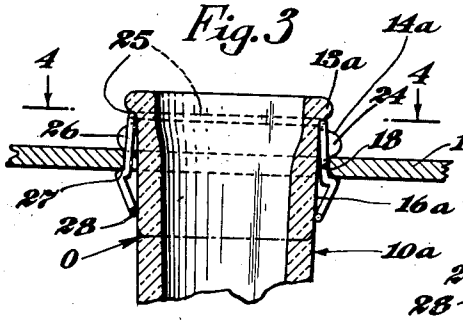


Fig. 4

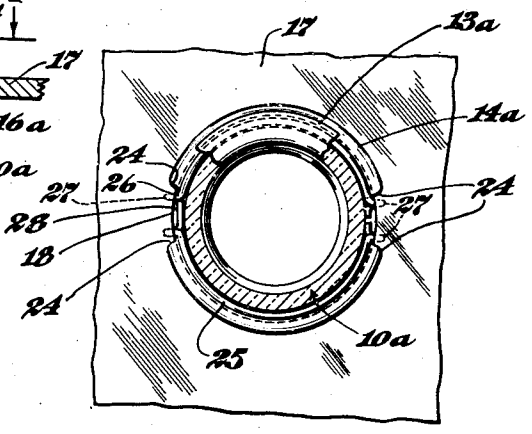
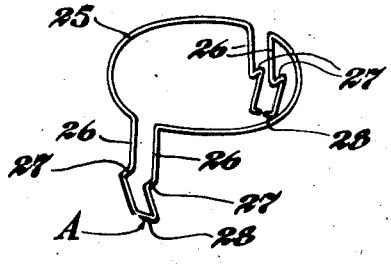


Fig. 5



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HIGH TENSION SIGN INSULATOR AND ATTACHING MEANS THEREFOR

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Fig. 6

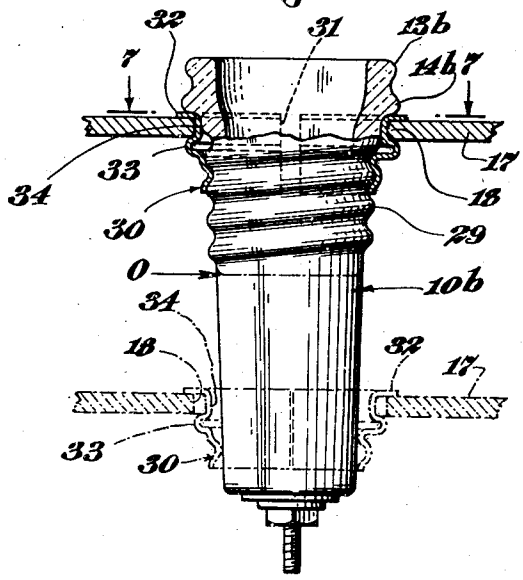


Fig. 7

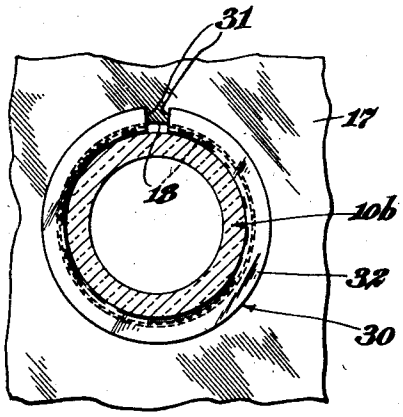


Fig. 8

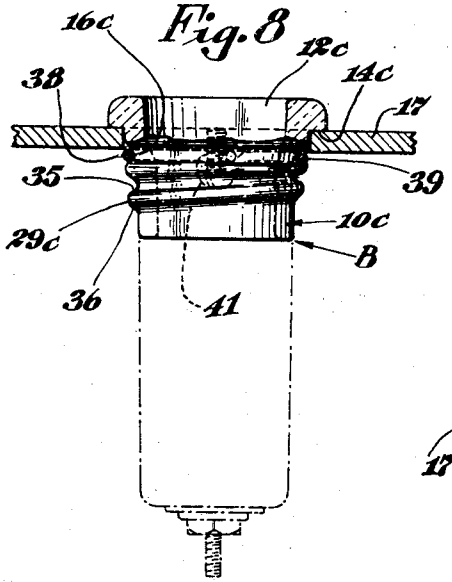


Fig. 9

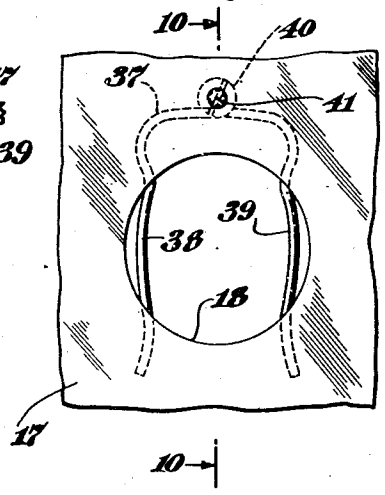
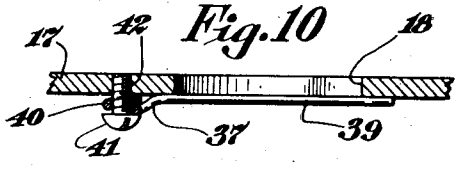


Fig. 10



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HIGH TENSION SIGN INSULATOR AND ATTACHING MEANS THEREFOR

Filed Oct. 5, 1936 3 Sheets-Sheet 3

Fig. 11

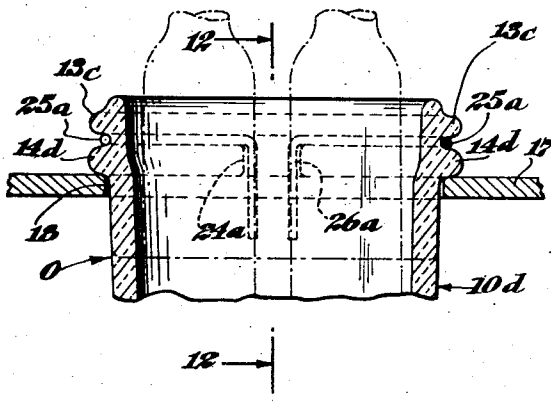


Fig. 12

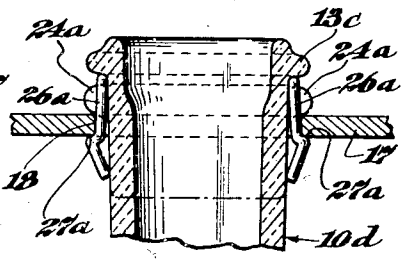
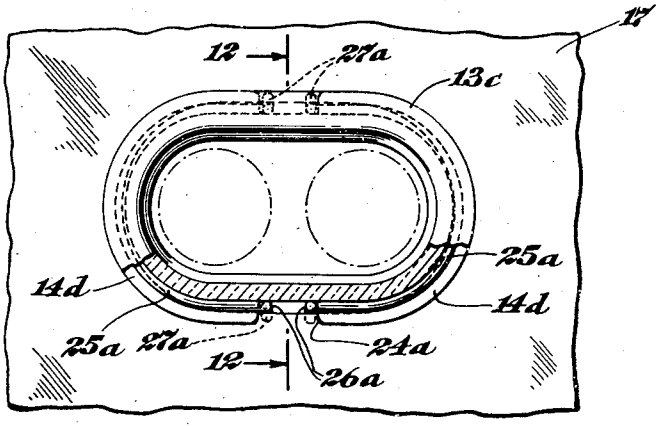


Fig. 13



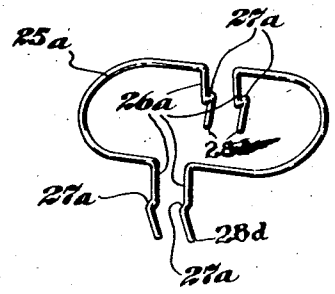


Fig. 14

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Patented Oct. 29, 1940 2,219,327

UNITED STATES PATENT OFFICE

2,219,327

HIGH TENSION SIGN INSULATOR AND ATTACHING MEANS THEREFOR

Samuel C. Miller, New York, N. Y.

Application October 5, 1936, Serial No. 103,964

11 Claims. (Cl. 173—339)

My invention relates to an insulator construction and attaching means therefor, particularly useful in connection with high tension illuminants, such as neon tube assemblies. More particularly my invention relates to insulators of the character and for the purpose mentioned, in the form of housings or collars and attaching means therefor, particularly where the insulating material constitutes glass of the low expansion boro-silicate type, such as disclosed in Sullivan and Taylor, Patent No. 1,304,623.

While glass, specifically that of the type above referred to, provides an excellent insulator, of proper dielectric qualities and density or freedom from porosity, its use for purposes contemplated by me is not commercially feasible because this glass in its formation for insulators must be shaped at extremely high temperatures by casting operations utilizing a plunger type of core. Accordingly, the incorporation into the mold parts of mold configurations which are to serve as the means for attaching the insulators in position, of the character heretofore employed, is not suitable where glass of the character referred to constitutes the insulator material.

In the utilization of insulators of the character described, which are arranged to be assembled in connection with sign frames of the neon tube type, these frames frequently take on considerable proportions and the attachment of insulators necessitates the cooperation of two men—one to locate the insulator from the front face of the frame and the other to fasten it from the rear face of the frame.

Accordingly, one phase of my invention resides in the provision of fastening means for insulators of the character described, which are capable of attachment from the front face of the sign frame and the location and fastening of the same from that position.

A further object of my invention resides in the provision of attaching means for insulators which permit of front face attachment and location, and of such form and construction to permit the employment of glass of the character described.

A further object of my invention is to provide a form of insulator for the purposes described, employing glass and attaching means permitting the location and attachment of the insulator from the front face of the sign framework, avoiding the introduction of attaching means which will reduce the efficiency of the insulator for its intended purpose, particularly in high tension electrical installations for illuminants of the character described.

Thus, my invention has for its object the provision of insulators permitting the employment of glass of the character mentioned, while retaining all the efficient operating conditions attained by this form of insulating material.

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

Figure 1 is a fragmentary sectional view of one embodiment of my invention, of an insulator and attaching means;

Figure 2 is a section taken on the line 2—2 of Figure 1;

Figure 3 is a fragmentary sectional view of another embodiment of my invention;

Figure 4 is a fragmentary section taken on the line 4—4 of Figure 3;

Figure 5 is a perspective view of the attaching element shown in Figures 3 and 4;

Figure 6 is a fragmentary sectional view of another embodiment of my invention, illustrating also the means of attachment;

Figure 7 is a section taken on the line 7—7 of Figure 6;

Figure 8 is a fragmentary sectional view of another embodiment of my invention;

Figure 9 is a plan view of a frame, disclosing the attaching means prior to the positioning of the insulator shown in Figure 8;

Figure 10 is a section taken on the line 10—10 of Figure 9;

Figure 11 is a fragmentary sectional view of another embodiment of my invention in connection with a twin electrode housing insulator;

Figure 12 is a section taken on the line 12—12 of Figures 11 and 13;

Figure 13 is a plan view of Figure 11;

Figure 14 is a perspective view of the attaching element illustrated in connection with Figures 11 to 13.

Making reference to the drawings, particularly Figures 1 and 2, I have illustrated an electrode housing insulator 10. This may preferably be of the general configuration referred to in my Patent No. 2,046,960, granted July 7, 1936, in which the insulator housing serves as mounting means for the terminal and contact support of a high voltage electrical illuminating sign, such as a neon tube sign and which, with the exception of the attaching means herein more

specifically described, may incorporate the features of such housing in all other respects.

Accordingly, the housing mentioned is arranged to dispose a contact terminal 11 opposite to a central boring 12, formed in the mouth 13 of the housing. Adjacent to the mouth 13, there is provided a peripheral flange 14. Inwardly spaced from the flange 14, there is formed a second abutment flange 15, leaving a neck 16 between the aforementioned flanges.

The insulator just described is arranged to be attached to the frame 17 of a neon tube construction and this is provided with an orifice 18, the dimensions whereof permit passage therethrough of the abutment flange 15 but are less than the maximum dimension of the flange 14, whereby this may abut the walls of the orifice 18.

The general configuration of the insulator housing thus described is particularly amenable to casting operations where glass is employed. Thus, the plunger type of core mechanism used in connection with molds for casting may readily be employed in that there are no fine or sharp corners, prohibitive in casting glass of the heat resisting type. The interior as well as the exterior configuration of the insulator just described being of extremely simple contour, the mold necessary for casting the glass may be used repeatedly, to make such glass available commercially for the intended purpose.

However, the simplicity of configuration, eliminating sharp corners, orifices, makes the attachment of this type of construction unsuitable for known types of attaching devices, especially in accordance with the primary objective of my invention, to provide attaching means permitting the insertion of the insulator member from the front face of the frame 17, through the orifice 18, without the assistance of someone to position the attaching means from the rear face of the frame 17, as is required in connection with the attaching collar shown in my patent aforementioned.

Accordingly, having provided the insulator member embodying the elements already described, either in a housing adapted to support the contact terminal assembly 11 or severed at an intermediate point along the line 0, forming the collar, I will now refer to the attaching device contemplated by me.

For this purpose, I provide a plurality of clips 19, having an upper branch 20 and a lower branch 21, which are arranged to span the outer and inner faces of the frame 17 and frictionally contact the same when disposed to engage the side walls of the orifice 18. These clips are made of spring metal, such as tempered steel or phosphor branze, to provide the requisite resiliency between the branches 20 and 21 in the loop-shaped section provided by these members. These clips include a lower section 22, by reflexively bending the sheet metal strip. Additionally, a camming portion 23 is formed by again reflexively bending the strip, as will be more clearly apparent from an inspection of Figure 1.

Thus, the clips provide orifice wall engaging branches 20 and 21, an extension 22 and a camming or latching portion 23.

With clips of the character described provided and attached at equi-distant points on the frame in respect of the orifice 18, the housing 10 may be disposed into attaching position by passing the lower end adjacent the contact terminal 11, through the orifice 18 and the clips positioned as described. The abutment flange 15 will then snap past the extension 22 and the camming portion and latch 23, locking the electrode housing in position in respect of the frame 17, in a concentric position with the orifice 18, and at the same time giving a resilient mounting. This, it will be observed, requires no assistance to effect the attachment at a point to the rear face of the frame 17.

It will also be observed that by the provision of clips of the character described, at spaced points, the minimum amount of metal is extended beyond the frame 17, around the insulator housing, leaving a substantial clearance between the neck 16, the flange 14 and the orifice 18 of the frame, as will be more clearly apparent from an inspection of Figure 2.

Such construction makes for high insulating efficiency, in that when the sign is exposed to the weather, rainwater can readily drain off through the space between the insulator and the wall of the orifice 18.

In Figure 3 I have illustrated another embodiment of my invention in which like parts have been given similar numbers, and substantially equivalent parts have been similarly identified with the letter *a*.

In this construction, the insulator, in the form of a housing 10*a* or collar, where the same is severed at a point along the line 0 is provided adjacent the mouth 13*a* with a flange 14*a*, leaving a peripheral groove between the flange adjacent the material 13*a* and the flange 14*a*. Beyond the flange 14*a*, the insulator is formed with a smooth faced neck 16*a*. The flange 14*a* is provided with cutouts 24 terminating in the plane of the neck 16*a*, as will be more clearly apparent from an inspection of Figure 4.

With such construction, I then provide a ring-shaped attaching device 25, more clearly illustrated in Figure 5, separate and apart from the assembly. This attaching device may be formed from spring wire forming a single member or twin sections, if severed adjacent the point "A" shown in Figure 5.

The ring-shaped portion 25 is arranged to be disposed exteriorly of the insulator between the flanges 13*a* and 14*a* and includes downwardly dependent sections 26 directed in the slot 24 previously described so as to have these sections lie in substantial parallelism with the neck 16*a*. The sections 26 are provided with latching portions 27, which extend laterally for a small distance, as will be hereinfurther described. Beyond the latching portions 27 there are provided an extension including a bearing portion 28.

The dependent sections 26, the latching portions 27, and the bearing portion 28 are preferably bowed downwardly to extend these sections for a distance greater than the interior dimension of the orifice 18, spacing the sections from the neck 16*a*. However, the bearing portion 28 is inwardly directed to engage the neck 16*a*, thereby providing a resilient bowed portion between the point where the sections 26 engage the insulator above the flange 14*a* and where the bearing portions 28 engage the neck 16*a*.

The latching portions 27 are disposed laterally so that when the attaching means are affixed in position upon the insulator, the assembly, comprising the insulator, may be forced through the frame 17 by passing the same through the orifice 18. During this movement, the walls of the orifice will constrict the sections 26 against the neck 16*a* until the latching portions 27 have been passed through beyond the inner face of the

frame 17 and thereupon expand to engage the walls of the orifice 18 adjacent the inner face.

The insulator and attaching device just described have substantially all the features embodied in the same, as described in the prior construction, so far as the elimination of casting difficulties for the insulator. It will be understood, however, that though I have described the insulator and the attaching means as having particular novelty where the insulator material is made of glass, in that this is readily adapted for commercial casting operations where glass is employed, the features of my insulator and attaching devices may equally be employed with other insulating materials, such as porcelain, hard rubber and other insulating materials.

In Figures 11 to 14 I have illustrated my invention embodying substantially the identical attaching means illustrated in Figures 3, 4 and 5, where applied for use in connection with mounting a plurality of electrodes, and in these figures, I have illustrated what may generally be referred to as a twin electrode housing insulator.

Thus, it will be observed that an elongated insulator receptacle 10*d* is provided, and except for the elongated contour of general oval shape in cross-section and the corresponding contour of the orifice in the frame 17, all other parts are substantially identical as the construction and attaching means shown in Figures 3, 4, and 5, and accordingly, the corresponding parts in Figures 11 to 14 have been designated with the same reference numerals as in Figures 3, 4 and 5, followed by the subscript *d*.

It will be observed that in the embodiments illustrated in Figures 11 to 13, substantially the same features as regards the configuration of the insulator and attaching means are involved, and are particularly novel for the so-called twin electrode housing insulator, where this member is made of glass of the type herein described and for efficiency in operation, as well as in attaching the insulator housing of this configuration.

In Figures 6 and 7 I have illustrated another embodiment of my invention, carrying out to a certain degree, the objectives heretofore emphasized in respect of the configuration of the insulator and the attaching means.

In this embodiment, the insulator housing 10*b* has formed adjacent its mouth an outer flange 13*b* and an inner flange 14*b* tapering abruptly into the neck of the housing, adjacent which portion there is formed a screw-threaded portion 29. From this point downward, the exterior of the insulator tapers gradually, forming an exterior wall to the base of the insulator adjacent the contact terminal mounting means.

The pitch of the taper is such that the widest portion of the insulator may pass through the orifice 18 formed in the frame 17.

In connection with this construction, I provide a collar 30 which is split longitudinally at 31. This collar is formed with an outer flange 32 materially larger than the orifice 18. Spaced from the flange 32 there is formed an inner flange 33, thereby providing a neck portion 34. Beyond the flange 33, the collar is embossed with a screw-threaded section tapered to form with the threaded portion 29 on the insulator. In installing the insulator 10*b*, the collar 30 is first positioned into the orifice 18, as more clearly shown in dotted lines in Figure 6, passing the threaded portion 30 through the orifice until the inner flange 33 has passed the inner face of the frame 17, and the outer flange 32 abuts the outer face of the frame 17. In this position, the insulator is then disposed through the collar until the screw-threaded portion 29 engages the threaded portion of the collar. Screw-threading the insulator in relation to the collar progressively moves the insulator through the orifice and through the collar, accompanied by a spreading of the collar, due to the tapered configuration of the screw-threaded portion 29 on the insulator, to the limit that the inner flange 32 is expanded to engage the walls of the orifice 18 in the final position, as shown in Figures 6 and 7. It will be understood that some instrumentality, such as a screw driver, may be inserted at the split portion 31 of the collar to hold the collar against relative rotation during the time that the insulator is rotated to effect the attaching action.

It will be observed that the construction in connection with Figures 6 and 7 embodies the features heretofore described, in respect of the insulator, by reason of its simple contours, making this construction particularly amenable to employ glass as an insulating material.

Furthermore, attachment of this insulator may be effected through the front face of the frame without requiring any assistance at a point to the inner or rear face of the frame 17.

It will also be observed that while I have described the insulator 10*b* of the general contour forming a receptacle or housing of the type illustrated in my aforementioned patent, the insulator may be formed as a collar by severing the portion adjacent the point indicated by the arrow 0.

In Figures 8, 9 and 10, I have illustrated a still further embodiment of my invention, wherein the collar 10*c* having a boring or central orifice 12*c* is shaped exteriorly thereof to provide a flange 14*c* beyond which the collar extends into a neck portion 16*c*, terminating into a screw-threaded portion 29*c*. It is preferred that the rear walls of the threads 25 be more abrupt than the forward thread walls 36, for purposes which will more clearly appear as this description proceeds.

Beyond the last convolution of the screw-threaded portion 29*c*, the exterior wall of the insulator is generally cylindrical or gradually tapers to its co-terminus B, where a collar is formed, though this may extend for an additional length to form a receptacle or housing, as shown in dotted lines in Figure 8 beyond the point B.

With an insulator of the character illustrated in Figure 8, I provide attaching means in the form of a spring clip 37 having spaced bowed branches 38 and 39 connected together by a loop 40. The clip 37 may be attached to the rear face of the frame 17 by a screw or similar attaching member 41, engaging the orifice 42 in the frame 17, thereby holding the clip 37 with the branches 38 and 39 transversely of the orifice 18. It will be understood that the clip 37 is formed of spring wire, with the branches 38 and 39 normally disposed towards each other for a distance materially less than the diameter of the orifice 18, but sufficiently spaced apart to permit insertion of the base of the insulator 10*c*. When the clip 37 is disposed as described, I may affix the insulator 10*c* in position by passing its base through the orifice 18 until the screw-threaded portion 29*c* engages the branches 38 and 39. A rotation of the insulator 10*c* will draw the insulator in position until the flange 14*c* engages the front or outer face of the frame 17. It will be understood, however, that similar attachment may be made

by pressing the insulator 10c to its full limit until the flange 14c engages the front or outer face of the frame 17. However, this might displace the branches 38 and 39 from their normal position, and accordingly, rotation, tending to draw the branches 38 and 39 in engagement with the inner face of the frame 17, is desirable. To effect the engaging action in a more positive way, I have formed the threads 29c so that the rear threaded wall is more abrupt than the forward threaded wall of the screw-threaded portion 29c. Thus, the forward threaded wall of the screw-threaded portion 29c may permit the insulator to act as camming portions in pressing the insulator into position between the branches 38 and 39, without rotation, yet permitting the seating of the branches 38 and 39 substantially flush with the inner face of the frame 17, upon rotation of the insulator.

It will thus be observed that though the construction described in Figures 8 and 9 may require a preliminary attachment of the attaching clip 37 in position on the rear face of the frame 17, thereafter, the insulator may be positioned from the front face of the frame 17, without any assistance, at a point from the rear face of the frame.

However, in all of the embodiments illustrated, the configuratiotn of the insulator is particularly amenable to casting operations employing heat-resisting glass as the material to be cast.

The form of the insulators described is particularly novel with the attaching devices, making for a high order of simplicity of installation, without sacrifice of efficiency in operation, under the most adverse weather conditions when employed in exterior installations.

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

1. A high voltage electrode insulator assembly for combination with a sign frame and insertable and attachable solely from the front face thereof through an orifice in said frame, said frame forming one element of the combination, a glass insulator forming another element, said insulator being formed adjacent one end with a flange larger than said orifice and with the other end thereof arranged to pass through said orifice, a second flange formed on said insulator, the space therebetween forming a seat, and attaching means thereon to lie along the exterior walls of said insulator, said attaching means having a portion for engaging one of the elements and a portion for engaging the other element to hold said elements in opposed frictional and resilient engagement, and said attaching means having an additional portion which is accessible from the front face of the frame for locating the said attaching means and for removal of the insulator from the assembly, said last mentioned portion being disposed in said seat.

2. A high voltage electrode insulator assembly for combination with a sign frame and insertable and attachable solely from the front face thereof through an orifice in said frame, said frame forming one element of the combination, a glass insulator forming another element, said insulator being formed adjacent one end with a flange larger than said orifice and with the other end thereof arranged to pass through said orifice, a second flange spaced from said first mentioned flange, the space intervening between said flanges forming a seat, and attaching means comprising substantially arcuately shaped members disposed in said seat and including downwardly depending portions, said downwardly depending portions being formed with latching members engaging the inner face of said frame whereby the insulator and attaching means may be affixed to said frame.

3. A high voltage electrode insulator assembly for combination with a sign frame and insertable and attachable solely from the front face thereof through an orifice in said frame, said frame forming one element of the combination, a glass insulator forming another element, said insulator being formed adjacent one end with a flange larger than said orifice and with the other end thereof arranged to pass through said orifice, a second flange spaced from said first flange providing a seat in the intervening space between said flanges, longitudinally formed slots formed in said first flange, attaching means comprising a resiliently formed ring shaped member positioned in said seat and including dependent portions extending through said slots, said dependent portions being outwardly resiliently bowed and including a bearing portion engaging the outer wall of said insulator, said dependent portions being formed at a point intermediate the ends thereof with outwardly directed latching portions arranged to engage the interior face of the frame upon passage of said dependent portions and insulator through said orifice.

4. A high voltage electrode insulator assembly for combination with a sign frame and insertable and attachable solely from the front face thereof through an orifice in said frame, said frame forming one element of the combination, a glass insulator forming another element, said insulator being formed adjacent one end with a flange larger than said orifice and with the other end thereof arranged to pass through said orifice, a second flange spaced from said first flange forming therebetween an annular slot, spaced attaching means one end whereof engages the second mentioned flange and including portions engaging said annular slot to be held seated therein, the opposite ends of said attaching means being exposed to extend from the front face of the frame through the orifice of said frame and including a portion engaging the interior face of said frame.

5. A high voltage electrode insulator assembly for combination with a sign frame and insertable and attachable solely from the front face thereof through an orifice in said frame, the combination therewith of a glass insulator, said insulator being formed adjacent one end thereof with a flange, a second flange larger than said orifice and closely spaced from said first flange to provide between said flanges an annular slot, longitudinally disposed slots in said second flange, and attaching means having a portion disposed in the annular slot abutting said first flange and having another portion insertable through said orifice and through said longitudinal slot and resiliently and frictionally engaging said frame on its interior face.

6. A high voltage electrode insulator assembly for combination with a sign frame and insertable and attachable solely from the front face thereof through an orifice in said frame, an insulator formed with a flange adjacent one end thereof, another flange adjacent thereto of a size larger than said orifice of said frame, said flanges being amenable to glass casting operations and located along the exterior wall of said insulator to

provide therebetween an annular groove, said second mentioned flange being formed with longitudinally directed slots, said flanges, the groove formed therebetween and said slots, cooperating to form seats for attaching means, a portion of which attaching means is seated in said annular groove, another portion of said attaching means being disposed through said slots and to extend along said insulator for engaging the interior face of said frame to hold said insulator and frame against displacement in relation to each other.

7. A high voltage electrode insulator assembly for combination with a sign frame and insertable and attachable solely from the front face thereof, through an orifice in said frame, comprising in combination an insulator formed with a pair of spaced annular flanges, contoured to be amenable to glass forming operations, said flanges being consecutively and closely spaced from the front end of said insulator, the flange farthest from the front end being larger than the orifice of said frame and cooperating with resilient attaching members for attaching the insulator to the frame and arranged to lie on the exterior wall of said insulator for passage with said insulator through said orifice, the space between said flanges serving as a seat for said attaching members.

8. In a high voltage sign construction including a supporting frame having an orifice therein, an electrode insulator assembly including an insulator of surface contour amenable to glass forming operations, one end whereof is tapered and insertable from the front face of said frame through said orifice, the opposite end including closely adjacent thereto in consecutively arranged positions, a seat and an annular flange larger than said orifice, and an attaching device comprising a peripheral ring-shaped portion maintained against displacement in said seat and for carrying said attaching device into attaching and releasing position from the front face of said frame and resiliently distended extensions on said portion arranged to extend through said frame from the front face to the other side thereof and including latching portions for engaging the walls of said orifice on the interior face of said frame.

9. In a high voltage sign construction including a supporting frame having an orifice therein, an electrode insulator assembly including an insulator, one end whereof is insertable from the front face of said frame through said orifice, the opposite end including closely adjacent thereto in consecutively arranged positions, a seat and an annular flange of surface contour amenable to glass forming operations, said flange being larger than said orifice, and an attaching device comprising a peripheral ring-shaped portion maintained against displacement in said seat and for carrying said attaching device into attaching and releasing position from the front face of said frame, said attaching device comprising resiliently distended extensions on said ring-shaped portion including latching portions engaging the walls of said orifice on the inerior face of said frame.

10. In a high voltage sign construction including a supporting frame having an orifice therein, an electrode insulator assembly including an insulator, one end whereof is insertable from the front face of said frame through said orifice, the portions adjacent the opposite end including a plurality of consecutively arranged annular protuberances forming spaced flanges amenable to glass forming operations and of which flanges the one most inwardly positioned being larger than said orifice, the spacing between said flanges forming a seat in which an attaching device is disposed and which device comprises a resilient member adapted to lie adjacent the exterior wall of said insulator and including a portion engaging the interior face of said frame and arranged to extend from the frame face to the other side thereof and formed with portions to engage said insulator, the larger of said flanges holding the insulator against projection through the orifice of the frame on the exterior face, the other of said flanges serving as a seat for engaging a portion of said attaching device to hold said insulator against relative movement in respect of said frame.

11. In a high voltage sign construction, an electrode insulator assembly including an insulator interiorly formed to house a plurality of sign electrodes, the exterior surface adjacent one end whereof is insertable from the front face of said frame through an orifice of elongated contour, holding the assembly against rotation, the opposite end of said insulator including a plurality of consecutively arranged annular protuberances forming spaced flanges amenable to glass forming operations and of which flanges the one most inwardly positioned being larger than said orifice, the spacing between said flanges forming an exterior seat in which an attaching device is disposed and lies on the exterior wall of said insulator, said device being formed with a part arranged to engage the interior surface of said frame as the assembly passes through said orifice, the limits of movement of said assembly through said orifice being determined by said larger and inwardly disposed flange, and the exteriorly disposed position of said seat making said attaching device accessible from the front face of said frame for removal of the assembly.

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