Oct. 30, 1928.

W. F. HENDRY

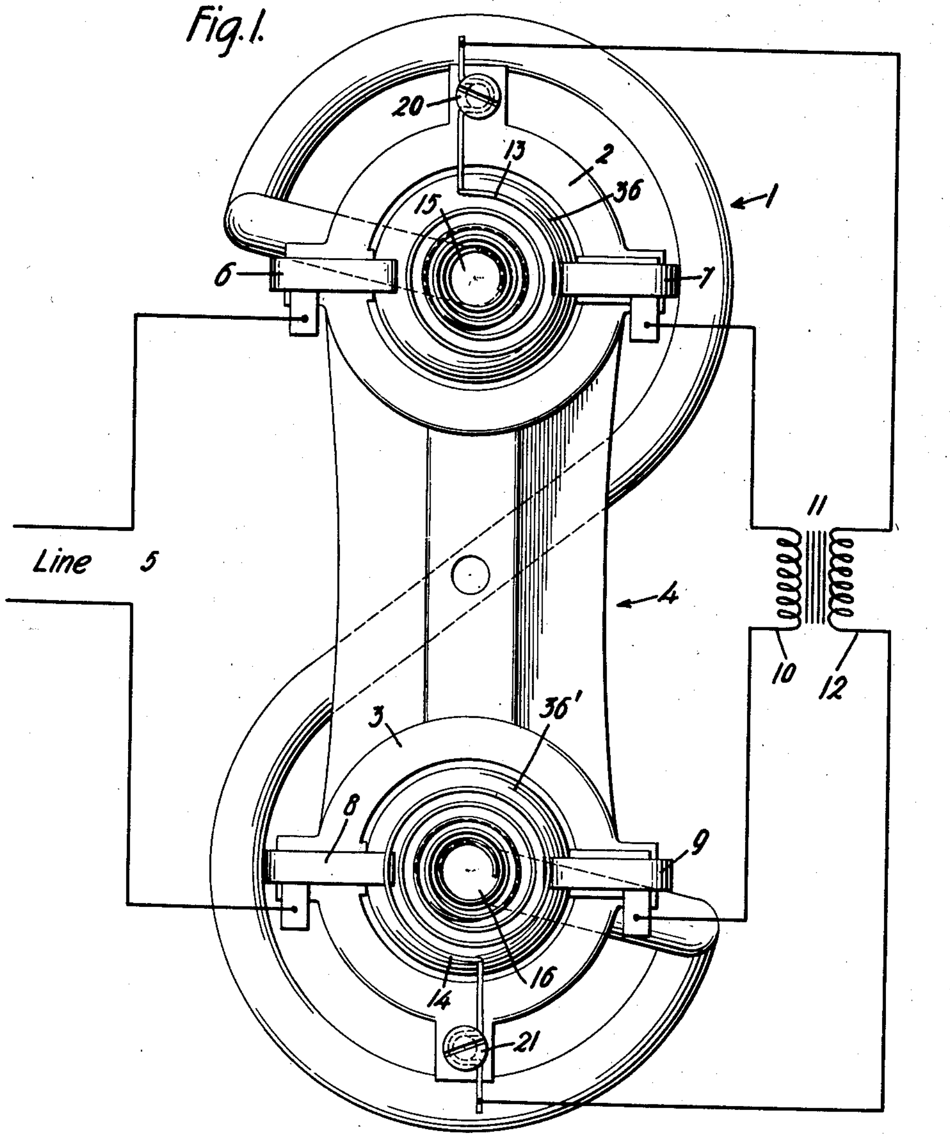
1,689,485

CURRENT SUPPLY SYSTEM

Filed May 12, 1927

3 Sheets-Sheet 1

Fig. 1.



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CURRENT SUPPLY SYSTEM

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3 Sheets-Sheet 2

Fig. 2.

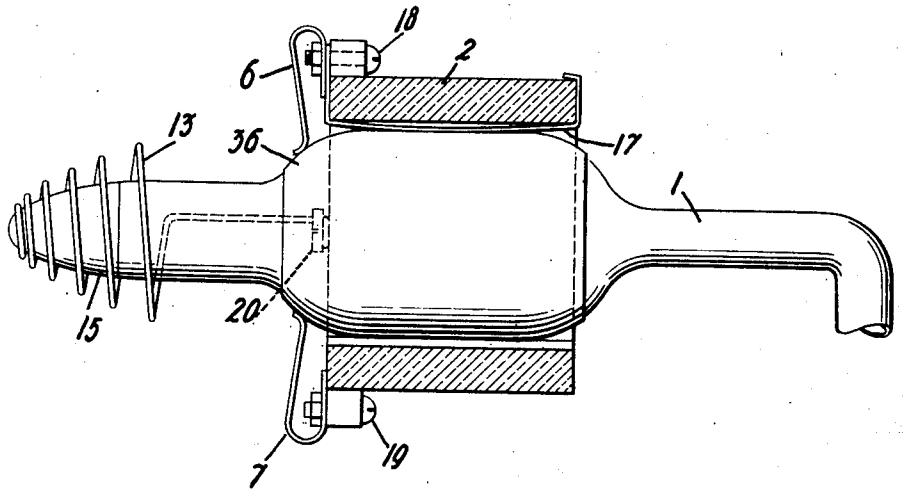
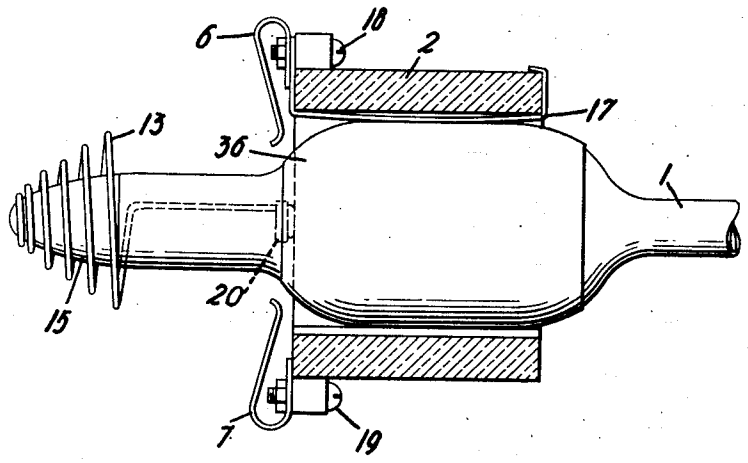


Fig. 3.



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1,689,485

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CURRENT SUPPLY SYSTEM

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3 Sheets-Sheet 3

Fig. 4.

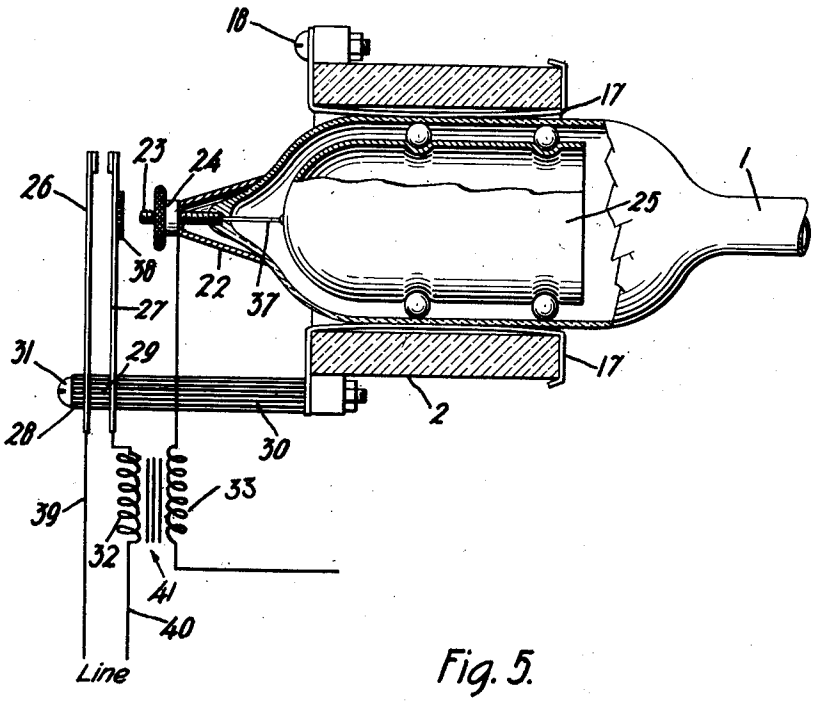
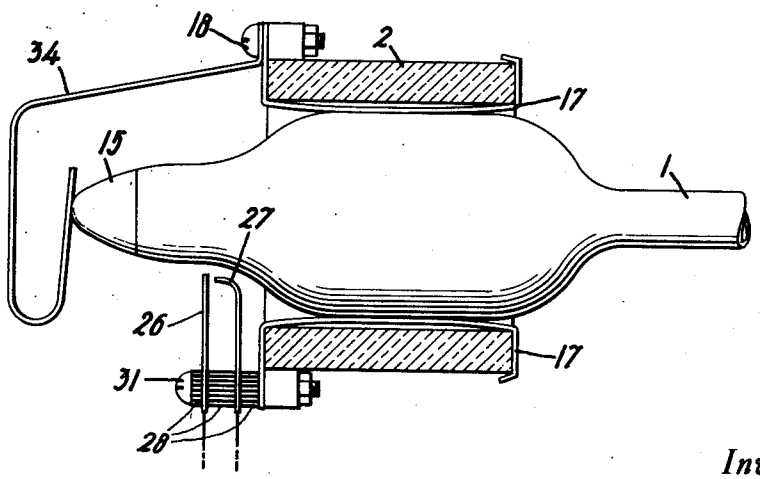


Fig. 5.



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Patented Oct. 30, 1928. 1,689,485

UNITED STATES PATENT OFFICE.

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CURRENT-SUPPLY SYSTEM.

Application filed May 12, 1927. Serial No. 190,804.

This invention relates to current supply systems for electric signs and relates more particularly to current supply systems for electrical discharge illuminating tubes.

An object of the invention is the provision of switching means for the current supply circuit of an electrical discharge tube sign whereby when the sign is removed from its holder the supply circuit will be broken and the sign deenergized.

Another object of the invention is the provision of a sign receptacle having automatic circuit breaking means integral with the base thereof whereby as a sign tube is removed from the socket the current supply system of the sign is broken.

Electric signs of the type comprising a plurality of letters formed from bent tubes of glass and having a filling of rare gas therein, such as neon, helium or the like are now known to the art. For convenience, such signs will hereinafter be spoken of as neon signs. Certain of these signs are made in the form of individual letters which consists of a bent tube of glass having at the ends thereof a pair of bulb shaped terminals which are provided with contact means for supplying the current to the letter. These bulb shaped terminals are so constructed as to fit into a pair of sockets supported by the sign structure proper. It is particularly to this type of sign that my invention relates.

Neon tube signs of the individual letter type are made up of a plurality of such letters, as a rule. However, for the sake of clearness in explaining my invention, I shall refer to it as applied to a single letter only.

Neon tubes in general require a relatively high potential current for their operation and hence it has been the custom to secure the high potential necessary for the operation of these signs by stepping up the potential of an ordinary commercial lighting line by means of a transformer. As the potential from the secondary of these transformers is relatively high, precautions must be taken to prevent the injury of persons working around the sign, replacing letters, repairing, etc., and also to protect the insulation of the secondary wiring leading to the neon tube.

I have devised a circuit arrangement whereby when a sign letter is removed from its socket, the primary circuit of the transformer supplying the letter with high potential current will be broken and there will be no danger of one who is working around the sign being injured.

I accomplish this result by providing at the terminal ends of a sign letter tube a metallic sleeve which contacts with terminals in the tube socket in such manner that when the sign letter is withdrawn from its socket the primary circuit of the tube energizing transformer is broken.

These and other objects and advantages of my invention will appear more clearly in connection with the following description and accompanying drawings.

In the drawings Fig. 1 represents a sign letter unit constructed in accordance with my invention.

Fig. 2 shows a section of the tube socket of Fig. 1.

Fig. 3 is a showing the same as in Fig. 2 except that the sign letter is partially withdrawn from the socket.

Fig. 4 illustrates a modification of a sign tube socket constructed in accordance with my invention.

Fig. 5 illustrates another modification of the invention.

Referring to Fig. 1 of the drawings, reference numeral 1 indicates a sign tube letter S, positioned in sockets 2 and 3 of a tube holder 4. The tube is energized by means of current from alternating current line 5 which current is passed through contacts 6, 7, 8 and 9 to the primary 10 of a transformer 11. The secondary 12 of the transformer 11 is connected to springs 13 and 14, which in turn contact with terminals 15 and 16 of the sign letter 1. These two springs 13 and 14 are held in place by two screws 20 and 21 respectively which attach the springs to the sockets 2 and 3 respectively.

Referring to Fig. 2, reference numeral 2 indicates the tube socket. Positioned within the tube socket 2 is tube 1. Tube 1 has an enlarged portion which is covered by a metallic sleeve 36 which serves, when the tube is fully thrust into its socket, to make contact beween two contact springs 6 and 7. These springs 6 and 7 are held in position on socket 2 by means of screws 18 and 19. Current is communicated to the inside of tube 1 by means of a metallic thimble 15 which is positioned on the outside of the tube and which is secured to a leading-in wire which connects on the inside of the tube

with an electrode which is not shown. Current is passed to thimble 15 by means of a helical spring 13 which is attached to socket 2 by means of a screw 20. Spring member 17 serves to hold tube 1 in its socket against the pressure of springs 6 and 7.

Fig. 3 is a showing identically the same as in Fig. 2 except that the tube 1 is partially withdrawn from socket 2. It is therefore believed unnecessary to give a detailed explanation of the figure. It will be noted in connection with Fig. 3 that as the tube is withdrawn from the socket metallic sleeve 36 breaks contact with springs 6 and 7 while spring 13 still remains in contact with thimble 15.

In Fig. 4 reference numeral 1 indicates a tube which is positioned within a socket 2 and secured therein by means of springs 17 which are attached to socket 2 by means of two screws 18 and 19 respectively. The terminal structure of the tubes shown in this figure is different from that shown in the preceding figures in that a conical metal cap is provided at the end of the tube. Passing through this conical cap is a screw 23 which attaches to a lead-in wire 37. The lead-in wire connects on the inside of the tube with an electrode 25 which is positioned away from the glass wall of the tube by means of glass beads in a well known manner. Attached to screw 23 is a nut 24 which serves to clamp a wire against conical cap 22. Attached to the socket 2 by means of screw 31 is a pair of contact springs 26 and 27 which are insulated from each other by means of insulating washers 28 and 29 and spaced from the socket 2 by means of an insulating sleeve 30. Mounted on contact spring 27 is a piece of insulation 38 which is so arranged that as tube 1 is thrust into its socket, screw 23 strikes the insulating member and causes contact springs 26 and 27 to come together. An alternating current line is attached to contact springs 26 and 27 by means of two wires 39 and 40. In series between the wire 40 and contact spring 27 is the primary 32 of a transformer 41. Secondary 33 of transformer 41 has one terminal connected to the leading-in wire 37 of tube 1 by means of nut 24, screw 23 and the metallic cap 22. The other terminal of secondary 33 is shown as unconnected but is to be understood as connected to the other terminal of tube 1 which is not shown.

In Fig. 5 tube 1 is illustrated as seated within socket 2 and having its thimble terminal 15 contacting with a spring 34 which is attached to the socket tube by means of a screw 18. Mounted on the opposite side of socket 2 are two contact springs 26 and 27 which are held to the socket 2 by means of a screw 31 and insulated from each other by means of insulating washers 28. These two springs 26 and 27 are so positioned relative to the tube 1 that as the tube is thrust into socket 2 thimble 15 will make contact with spring 34 before the side of the glass tube contacts with spring 27, and conversely so that upon the withdrawal of tube 1 contacts 26 and 27 will be separated before thimble 15 breaks contact with spring 34. Tube 1 is held within socket 2 by means of springs 17 which springs are in turn held to the socket 2 by means of screws 18 and 31.

The operation of the device shown in Figs. 1, 2 and 3 is as follows. With the tube 1 fully seated in sockets 2 and 3 of holder 4 the tube is energized and gives forth light. The circuit which energizes the tube may be traced as follows. From the line 5 current passes through contact spring 6, metallic sleeve 36, spring 7, through the primary 10 of transformer 11 to contact spring 9, sleeve 36^1, contact spring 8, and back to the line 5. As the transformer 11 is now energized current passes from this secondary 12 to contact spring 13 thence to thimble 15 through the tube, thimble 16, spring 14 and back to the secondary 12 of the transformer. Now, if it is desired to remove the tube from the socket for any reason such as the making of repairs, replacements, inspection or cleaning, it is necessary merely to grasp the sign letter in the hands and withdraw it from holder 4. As the tube is withdrawn from its sockets, for example socket 2, the metallic sleeve 36 draws away from spring 6 and 7, thereby opening the contact between the springs and breaking the input circuit of transformer 11, thus deenergizing the transformer, and hence the tube. As the tube is drawn still further from the socket the thimble 15 breaks contact with spring 13 which opens the secondary of the transformer circuit. The construction of spring 6 and 7 is such that sleeve 36 breaks contact with the springs before thimble 15 breaks contact with the spring 13, that is to say, the primary circuit of transformer 11 is broken and deenergized before the secondary circuit is broken. This feature is particularly advantageous as it prevents sparking between the spring 13 and the thimble 15 which might damage the tube 1 or cause fire around the sign holder. Likewise this feature has a marked advantage in the case where transformer 11 is of the constant current type. If transformer 11 were of the constant current type and the springs 6 and 7 were not constructed to open the primary circuit of the transformer before the secondary circuit was opened excessive potentials might be developed in the secondary of the transformer 11 due to the decrease in load resulting from the breaking of the secondary circuit of the transformer. This excessive potential would not only be extremely dangerous to persons working around the sign but also might damage the

secondary wiring of the transformer or the secondary of the transformer itself.

In some circuits it is desirable to open both sides of the line circuit and in such a case an arrangement as shown in Fig. 1 should be used. However, other types of circuits might necessitate the breaking of one side of the line only, in which case but a single set of contacts would be necessary. In place of the transformer for energizing the tube some other source of current might be used, such as a motor generator set, or special generator, and in such case the socket contacts instead of controlling the transformer primary circuit might control the field circuit of the generator supplying the tube, and serve to deenergize the said field upon withdrawal of the tube from its socket.

In certain cases it may be desirable not to use a metallic sleeve on the sign 2, in which case an arrangement such as shown in Fig. 4 may be used. The operation of the device shown in Fig. 4 is substantially the same as that shown in Figs. 1 to 3 except that the primary circuit of the transformer is controlled by means of two contact springs 26 and 27 which are closed by pressure exerted by the positioning of the tube 1 within its socket 2. As the tube is thrust in the socket, the end of screw 23 touches the insulating element 38 and forces springs 26 and 27 into contact, which closes the primary circuit of transformer 41, thus causing the secondary circuit to be energized. In removing a tube from a socket arrangement such as shown in Fig. 4, it is necessary merely to withdraw the tube from its socket a slight distance, then unscrew the nut 24 which will release the transformer secondary wire and allow the tube to be completely withdrawn from the socket.

The embodiment of the invention shown in Fig. 5 is substantially identical with that shown in Fig. 4 except for a slight change in minor details of construction. With this arrangement, the tube 1 on being seated in its socket contacts directly with a contact spring 27 and forces it against contact spring 26. These two springs are connected in circuit exactly the same as those shown in Fig. 4. As the circuit arrangement with both the modifications shown in Fig. 5 and Fig. 4 is the same, it is thought unnecessary to give a further description thereof.

It will be obvious to those skilled in the art that the invention is capable of a wide variety of modifications and adaptations and that the present disclosure is intended merely to illustrate its nature without limiting its scope which is defined in the following claims.

What I claim is:

1. In an electric sign, an electrical discharge light tube, a socket therefor, a transformer for supplying current to said tube and means associated with said socket for breaking the primary circuit of said transformer, responsive to withdrawal of the tube from its socket.

2. In an electric sign, an electrical discharge light tube, a socket for holding said tube, a transformer for supplying current to said tube and means comprising a spring contact associated with said socket for breaking the primary circuit of the transformer upon removal of the tube from the socket.

3. In an electric sign, an electrical discharge light tube, a socket therefor, means for energizing said tube and means associated with said socket and responsive to partial withdrawal of the tube from its socket for rendering said first means ineffective for energizing the tube, without disconnecting said means from said tube.

4. In an electric lighting system, a high voltage lamp, a socket for holding said lamp, a transformer for supplying current to said lamp, and means associated with said socket for breaking the primary circuit of said transformer responsive to withdrawal of the lamp from said socket.

5. In an electric lighting system, a high voltage lamp, a socket for holding said lamp, a transformer for supplying current to said lamp and means comprising a metallic sleeve on said lamp for breaking the primary circuit of said transformer responsive to withdrawal of the lamp from its socket.

6. An electric lighting system comprising a high voltage lamp, a socket for holding said lamp, a transformer for supplying current to said lamp and means comprising a metallic sleeve on said lamp and a contact spring on said socket for breaking the primary circuit of said transformer upon withdrawal of said lamp from said socket.

7. An electric lighting system comprising a high voltage lamp, a socket for holding said lamp, a transformer for energizing said lamp, connections between the secondary of said transformer and said lamp, and means associated with said socket for breaking the primary circuit of said transformer before the breaking of the secondary circuit of said transformer upon withdrawal of said lamp from the socket.

8. An electric lighting arrangement comprising a light tube having a contact, a socket for holding said light tube, a transformer for energizing said tube, a contact spring for connecting said tube contact to the secondary of said transformer and switch means associated with said socket for breaking the primary circuit of said transformer, responsive to withdrawal of the tube from the socket, before the contact between the said contact spring and said tube contact is broken responsive to such withdrawal of the tube from the socket.

9. In an electric sign, an electrical discharge light tube, a socket therefor, a transformer for supplying current to said tube, contacts on the socket and on the tube, and separable upon withdrawal of the tube from the socket, for interconnecting said tube and the secondary of said transformer, and means responsive to displacement of the tube in the socket for disconnecting the primary circuit of said transformer upon displacement of said tube in said socket before the separation of said contacts occurs.

10. An electric lighting arrangement comprising an electrical discharge tube having two end portions, a contact terminal attached to each of said end portions and connected with electrodes inside the tube, metallic sleeves on said tube, a pair of sockets for receiving said end portions, a contact spring on each of said sockets for making connection with each of said terminals, a pair of contact springs on each of said sockets so positioned as to press against said metallic sleeves when the tube is fully seated in the socket, a transformer for supplying current to said tube, one side of the primary thereof being connected in series with one of said pairs of contacts and the other side of said primary being connected in series with the other of said pairs and the secondary of said transformer being connected to the terminals on the said end portions of the tube.

11. In an electric lighting system, a high voltage lamp, a socket for holding said lamp, means comprising a high potential circuit and a low potential circuit for energizing said lamp, said high potential circuit serving to supply current to said lamp and said low potential circuit serving to control the current flow in said high potential circuit, and means responsive to a slight withdrawal motion of the said lamp from said socket for opening said low potential circuit.

12. In an electric lighting system, a high voltage lamp and a socket for holding said lamp, a high potential circuit for supplying current to said lamp, means for rendering said high potential circuit ineffective, and means responsive to withdrawal motion of said lamp from said socket for operating said last mentioned means.

In testimony whereof, I have signed my name to this specification this 10th day of May 1927.

WILLIAM F. HENDRY.